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SERIES OF 1900. BULLETIN NO. 1.

MASSACHUSETTS

CROP REPORT

FOR THE

MONTH OF MAY, 1900.

ISSUED BY

J. W. STOCKWELL,

SECRETARY STATE BOARD OF AGRICULTURE.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1900.

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Crop Report for the Month of May, 1900.

Office of State Board of Agriculture,
Boston, Mass., June 1, 1900.

We present herewith Bulletin No. 1, Crop Report for the month of May, the first of our series of monthly crop bulletins for the present season. Much the same general plan will be followed in their issue as in former years, and we shall, as usual, endeavor to place the bulletins in the hands of our readers as near the end of the month as possible. An article by some scientist of reputation will be included in each issue. This bulletin contains an article on "Insects injuring market garden crops," by H. T. Fernald, Ph.D., professor of entomology at the Massachusetts Agricultural College, which we would commend particularly to the attention of our readers.

Progress of the Season.

The May returns of the United States Department of Agriculture (Crop Circular for May, 1900) show the acreage of winter wheat to be about 26,585,000 acres, — 3,563,000 acres, or 11.8 per cent less than the area estimated to have been sown last fall. For the area remaining under cultivation the average condition is 88.9, as compared with 76.2 on May 1 of last year, 86.5 on the corresponding date in 1898, and 82.7, the mean of the averages of the last ten years.

The average condition of winter rye is 88.5, as compared with 85.2 on May 1 of last year, 94.5 in 1898, and 89.7, the mean of the May averages for the last ten years.

The average condition of meadow mowing lands is 90.8, against 84.9 on May 1 of last year, 92.9 in 1898, and 91.3, the mean of the May averages of the last ten years.

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The average condition of spring pasture was 91.3, against 83.5 on May 1 of last year, 91.2 in 1898, and 90.9, the mean of the May averages of the last ten years.

The proportion of spring plowing done by May 1 for the country at large was 68.4 per cent of the total expected, as compared with 57.2 last year, 72.4 in 1898, and 75, the the proportion usually done by May 1.

In consequence of the backwardness of the season, the statistician is unable to make the usual preliminary estimate of the new acreage of cotton.

Weather Summary January 1 to May 1, 1900.

(Furnished by the Weather Bureau, Boston.)

January was milder than usual, the temperature ranging from 1° to 4° above the normal at all stations of official observation. The month opened with a general snow-storm which furnished the greater portion of the snowfall for the period and the first amount of consequence of the season. While the total snowfall for the month was less than the average, the precipitation, snow and rain combined, was in excess of the normal by about a half inch. A cold wave of moderate intensity prevailed for four days at the opening of the month, and the temperature during the closing week was below the average, but with these exceptions this element was in excess. There was an average amount of sunshine. The average number of days with .01 inch or more precipitation was 10.

February was distinguished by much unpleasant weather and more than the average amount of precipitation. The average number of days with rain or snow, 10, was the same as for the preceding month. The average precipitation, was, however, far in excess of that of January, and about 4 inches above the normal. Excepting rain in southern coast sections the precipitation was chiefly in the form of snow. The monthly mean temperature, 27°, was above the normal for February. The mercury fell below zero at all stations of observation at some time during the month. The coldest weather of the season occurred during the month.

March was notable for a preponderance of fine, clear weather, the average number of clear days, 15, being much in excess of the pleasant weather usually experienced during this month. There was an average of only 8 days with a measurable amount of precipitation, which is a remarkable occurrence for March weather. Notwithstanding the small number of foul days, the average precipitation for the month was fully up to normal, and for the greater portion of the State it was from 1 to 2 inches in excess. It occurred, however, principally during two storms, *i. e.*, 1st-2d and the 16th. The month was colder than usual, the monthly mean temperature being about 1.5° below the normal.

April was a pleasant month, with more than the average amount of fair weather. There were 12 sunny days, 7 with skies partially obscured and 9 with general cloudiness. The precipitation was deficient, the average amount for the month being about 1 inch below the normal. Snow flurries were of occurrence in parts of the State, but the amounts too small to measure. The temperature was fairly well distributed through the month. The monthly mean was 1° above the normal for April. The temperature fell below freezing during the month at all stations.

Temperature and Rainfall for the Whole Country.

[From United States Climate and Crop Bulletins.]

Week ending May 7. — The week averaged colder than usual in the Lake region, central and upper portions of the Ohio valley, northern New England, and from Oklahoma and western Texas westward over the southern plateau region. On the Atlantic and east Gulf coasts, and also in the upper Mississippi valley there was a slight but general excess in the daily temperature averages. From the Missouri valley westward to the north Pacific coast the week was decidedly warmer than usual. Over much the greater part of the country the week was drier than the average, practically no rain falling over large central areas, and also over the interior portions of the middle and south Atlantic States. There were excessive rains in Florida and along the

New England coast, and the rainfall in California was very unusual for the season.

Week ending May 14. — The week averaged slightly cooler than usual over portions of the central and east Gulf States and the northern portion of the middle Atlantic States, and was decidedly cooler than usual over northern New England. Nearly normal conditions prevailed over the interior portions of the middle and south Atlantic States and central Ohio valley, but from the Lake region westward to the Pacific coast the week was warmer than usual. More than the usual amount of rain fell in the upper Ohio valley, and over portions of the Lake region and the upper Mississippi valley; and over the northern plateau region and the Pacific coast the rains were unusually heavy. In the Atlantic coast districts and the greater portion of the central valleys the week was drier than usual, and almost no rain fell over a large part of the south Atlantic and east Gulf States.

Week ending May 21. — The week was cooler than usual in the middle and southern Rocky Mountain districts, over portions of the Missouri and Mississippi valleys, and from Kansas southward to the Rio Grande valley. On the Pacific coast, along the northern border from Washington eastward to the upper lakes, and eastward of the Mississippi, except in Maine and southern Florida, the week was warmer than usual. Very heavy rains have fallen in Texas, over portions of the Missouri and upper Mississippi valleys, and along the Atlantic coast from Georgia northward. There was less than the usual amount of rain generally throughout the central Gulf States, Ohio valley, the greater part of the Lake region, and over the northern portions of the Mississippi and Missouri valleys.

Special Telegraphic Reports.

[Weather Bureau, Boston.]

Week ending May 7. — New England. Boston: Heavy rain checked farm work in coast sections, elsewhere weather favorable; too cool for rapid growth of vegetation; frosts occurred in parts of all New England States, and snow in northern portions without damage; oats sown in nearly all

sections, and coming up in southern portion; general outlook promising.

Week ending May 14. — New England. Boston: Weather unusually cool, ice half an inch thick formed on the 11th; peaches generally destroyed, tender vegetables killed, apples uninjured; little growth in vegetation; farm operations delayed; season a week to ten days late.

Week ending May 21. — New England. Boston: Week opened hot and closed cool, with heavy rain; grass made rapid, other vegetation medium growth; much planting in southern, little in northern part of district; season two weeks late.

The Weather for May, 1900.

May, as a whole, was a very unpleasant month. There was much more than the usual amount of cloudiness and very few days when the sky was wholly unobscured. The rainfall was also considerably in excess of the normal amount for the month. This was, however, fairly well distributed through the period. There was a general storm on the 3d, during which rain fell in about all sections of the State. The amounts were very large in coast sections. At Boston the total rainfall during the storm was 2.46 inches. General moderate showers occurred on the 8th and 9th. A "spell" of unsettled conditions prevailed from the 15th to the 21st, during which there were showers on each day in parts or the whole of the State. The rainfall during the 19th was generally heavy, especially in coast sections where the amounts ranged from 1 to 2 inches.

The average temperature for the month was considerably below the normal, the daily deficiency amounting to about 1° per day. With the exception of an unusually warm day on the 15th, when the mercury rose to 93° at Boston, the temperature was uniformly cool. Killing frosts were of general occurrence on the 10th and 11th, and in many localities where the conditions were favorable, thin ice formed. The lowest temperature recorded at Boston was 33° on the 11th. With two exceptions, May 3, 1874, when the temperature was 32°, and again on the 3d in 1881, when it fell

to 31°, the 15th of the present month was the coldest in the past 28 years at Boston. The month was marked by a prevalence of easterly and northerly winds. These, combined with the excess of cloudiness, have served to make the month one of the most unpleasant of the name within many years. At the close of May the tendency was to rising temperature and warmer weather.

In the circular to correspondents, returnable May 22, the following questions were asked : —

1. How does the present season compare, agriculturally speaking, with a normal season ?
2. What is the promise for pastures and mowings, and did fall seeding winter well ?
3. How did the fruit bloom compare with the bloom of former years, and has it suffered from late frosts ?
4. What insects appear to be doing the most damage in your locality ?
5. To what extent is spraying practised against insects attacking fruit, and is it on the increase in your locality.
6. Is farm help scarce, or plenty ; and what proportion can be called good help ?
7. What are the average wages paid farm help in your vicinity with board ? Without board ?
8. Will there be any marked change in the acreage of the usual farm crops, and do you note any new enterprises in the line of agriculture ?

Returns have been received from 62 correspondents and from them the following summary has been made up : —

The Season.

The season opened late and the continued cold weather of the greater part of the month has tended to still further retard vegetation. At the time of making returns the season was apparently ten days behind the normal in most sections. The cold weather of the early part of the month held vegetation in check and retarded the opening of fruit buds and the germination of seeds, most fortunately, as it proved, in view of the severe frosts of the 10th and 11th. These frosts

did much harm to early vegetables and field crops, and in a lesser degree to the fruit crop. Farm work is somewhat behind for the time of year, though well in hand considering the lateness of the season.

Pastures and Mowings.

Pastures and mowings are generally in excellent condition, and the rains of the 18th and 19th did much to insure a good hay crop. There are a few complaints of mowings winter-killing, but they are decidedly exceptional. Fall seeding did not winter as well as usual, owing to the lack of snow-covering during the past season. Over a third of the correspondents, an unusual proportion, report it to be in either "poor" or "fair" condition, or that it has winter-killed.

Fruit Bloom.

The fruit bloom was the heaviest in years in all sections and for all kinds of fruit. The severe frosts of the 10th and 11th did some damage, but not nearly as much as was feared at the time. Peaches suffered most severely, but the crop was not entirely ruined. Cherries and plums suffered considerably, especially in eastern sections, where they were furthest advanced, but the crop of these fruits still promises to be a fair one, though somewhat impaired. Apples were not far enough advanced to suffer injury save in very exceptional circumstances and a good set seems assured. Strawberries suffered considerably in eastern sections, but other small fruits appear to have escaped. The time of the fruit bloom was probably several days later than the normal, as was also the setting of fruit.

Insects.

Insects are doing very little damage as yet, the cold weather having probably held them in check. Many correspondents reported that no insects had appeared at the time of making returns. The tent caterpillar is the only one at all generally reported and they have done no appreciable damage thus far. Other insects spoken of as doing

damage are canker worms, cut worms, wire worms, bud moths, asparagus beetles and onion maggots.

Spraying.

As in past seasons we can say that spraying against insects attacking fruit appears to be constantly increasing, but that at best the spread of the practice is slow. We would again urge all farmers, whether fruit is a main crop with them or merely a side line, to spray, both with insecticides and fungicides, as the cost is small and the returns immediate and certain.

Farm Help and Wages.

There seems to be a fair supply of good farm help, though the supply of strictly first-class help is, as always, less than the demand. The proportion of farm help that may be classed as good appears to be increasing from year to year, and this year is no exception. Wages average about $18 per month with board, and from $30 to $35 per month without board. Wages for day work average $1.25 per day, with $1.50 in the busy seasons.

Acreage of Farm Crops.

There will probably be even less change than usual in the acreage of farm crops. About the only item worthy of note is a promised slight increase of the acreage of tobacco in the tobacco-growing district, though there may also be a slight increase in the acreage of forage crops and of corn for the silo. No new enterprises in agriculture are reported.

NOTES OF CORRESPONDENTS.

(Returned to us May 22.)

BERKSHIRE COUNTY.

Sheffield (Dwight Andrews). — The season is late and cold. Pastures and mowings look well and fall seeding wintered well. There was a full average fruit bloom, but it has suffered more or less from frosts. Tent caterpillars are doing some damage. Spraying is practised somewhat but not extensively. Farm help is scarce and one in ten is good help. Wages are from $18 to $20 per month with board and from $1 to $1.25 without board. There will be no particular change in the acreage of farm crops.

West Stockbridge (Wm. C. Spaulding). — The season is apparently ten days late, owing to cold weather. Pastures and mowings look finely; fall seeding winter-killed in spots where ice formed. Fruit blooms just appearing; looking well; not injured by frost as yet. Tent caterpillars are very numerous. Farm help is scarce and not over half of it is good help. Wages are from $1.25 to $1.50 per day without board. The acreage of farm crops will be the same as usual and there will be no new enterprises in agriculture.

Otis (S. H. Norton). — The season has been cold and planting is later than usual. Pastures and mowings promise well. The fruit bloom is about an average. At present no damage is being done by insects. Spraying is not practised in this vicinity. Farm help is very scarce and about half of it good help. Wages are from $15 to $20 per month with board and from $1 to $1.25 per day without board. There will be about the usual acreage of all farm crops.

Becket (W. H. Snow). — The season is about the same as last year, only that there has been more rain. The promise for pastures and mowings is good and fall seeding wintered well. The fruit bloom is just coming out with no injury from frost as yet. Farm help is very scarce and but a small proportion of it is good help. Wages average $20 per month with board and from $30 to $40 per month without board. There are no marked changes in the acreage of farm crops and no new enterprises in agriculture.

Washington (E. H. Eames). — The season is about a normal one, agriculturally speaking. Fall seeding wintered well and pastures and mowings are doing well; a good hay crop seems assured by the recent rains. Fruit trees are as yet hardly in blossom. No insects are doing damage at present. Farm help is scarce and not very good. Wages are from $15 to $20 per month with board and $1.50 per day without board. Not many crops have been planted as yet, with the exception of garden stuff and potatoes.

Cheshire (L. J. Northup). — The present season is a little backward. Pastures and mowings promise well and fall seeding looks fairly well. The fruit bloom promises well but it is a little early here to report on it. Tent caterpillars are about as plenty as usual. There is not much spring spraying done about here. Good farm help is becoming more scarce every year. Wages are $20 per month with board and $30 to $35 per month without board. I notice no marked changes in the acreage of farm crops.

Hancock (C. H. Wells). — The season is a little later than the normal. Pastures and meadows look well, but there is some complaint that fall seeding did not winter well. Apples, pears and cherries have blossomed quite well; very few plum blossoms; no damage from frosts. It is rather early for damage from insects. Very few practise spraying, but I think it is upon the increase. Farm help is good as a rule. Wages are $18 per month with board and from $20 to $25 per month without board. There is no particular change in the acreage of farm crops.

FRANKLIN COUNTY.

Rowe (J. F. Brown). — The season is above the average, agriculturally speaking. Pastures and mowings wintered well and fall seeding is looking finely. Fruit bloom appears to be first class and has not suffered from frost. Insects are doing no damage as yet. Spraying is practised by a few and is perhaps on the increase. Farm help is scarce and about half of it good help. Wages average $18 per month with board and $1.25 per day without board. There will be no appreciable change in the acreage of farm crops, but I think our farmers are inclined to raise more Durham and less Jersey stock.

Leyden (U. T. Darling). — The season is nearly two weeks later than usual. Fall seeding looks well and recent rains have greatly improved the pastures and mowings. Fruit bloom is not very far advanced, but so far as I am able to judge the prospect is favorable for a good crop. Insects have done very little damage, owing probably to the cold season. Spraying has been practised

but little, but will increase in the future. Farm help is scarce and not over a quarter of it is good help. Wages are from $18 to $22 per month with board and $1.50 per day without board. There are no marked changes in the acreage of farm crops and no new enterprises in agriculture.

Gill (F. F. Stoughton). — The present season is a very good one. Pastures and mowings are looking finely. Fruit trees blossomed full and have not suffered from frost as yet. No insects have appeared this early in the season. Spraying against insects attacking fruit is practised only to a small extent. Farm help is scarce. There are no marked changes in the acreage of farm crops.

Ashfield (Chas. Howes). — The season is backward owing to continued cold weather. Pastures and mowings are looking exceedingly well since the recent rains and fall seeding wintered well. Fruit trees were not injured by the late frosts and apples promise a full bloom. Very few insects are doing damage, potato bugs and tent caterpillars not having appeared. Spraying is practised to some extent and is rather on the increase. Farm help is very scarce this season, but is mostly fair help. Wages are $20 per month with board and from $1.25 to $1.50 per day without board. Grass is our principal crop; more corn is being planted each year, mostly for the silo.

Deerfield (Chas. Jones). — The season is about a week late. Mowings are looking fairly well; pastures are very good but a little late; fall seeding wintered well. All kinds of fruit trees have blossomed very full and there has been no damage from frost. Spraying is not practised here. Farm help was scarce the the first of April but is now more plenty. Wages average $18 per month with board and $32 per month without board. The acreage of tobacco will be slightly increased; no new enterprises in agriculture.

Sunderland (J. M. J. Legate). — The season is cold and from a week to ten days late. Pastures and mowings are looking well, but are rather late; fall seeding wintered well. The fruit bloom was much heavier than usual; plums and peaches suffered from the freeze of the 11th, but apples and pears were not far enough advanced to be injured. No injurious insects have shown themselves as yet. There is very little spraying done here; people are just beginning in a small way. There seems to be plenty of help and most of it is good. Wages average $20 per month with board and $1.25 per month without board. There will be a slight increase in the acreage of both onions and tobacco.

Wendell (N. D. Plumb). — The season is very backward. Fall seeding looks well and pastures and mowings are very promising.

Fruit trees are just beginning to bloom; apples are all right, but peaches are a failure. No insects are doing damage at present. Very little spraying is done here. Farm help is scarce and about one-fourth of it good. Wages are from $18 to $20 per month with board and $1.50 per day and $30 per month without board. It is too early in the season to note any changes in the acreage of farm crops.

New Salem (Daniel Ballard). — The season is about an average one. Pastures and mowings were greatly helped by the recent rains; fall seeding looks well as a rule. The fruit bloom was above the average; frost did some damage on low lands, but little or none on the hills. Tent caterpillars are in evidence, but are doing little damage. Quite a number of our farmers are spraying for the first time. Farm help is quite scarce and probably half of it is good help. Wages range from $12 to $20 per month with board and from $1 to $1.50 per day without board. The usual lines are being followed in the acreage of farm crops.

HAMPSHIRE COUNTY.

Prescott (W. F. Wendermuth).— The season is from two to three weeks late. Pastures are good but late; fall seeding wintered well. There was a full fruit bloom and very little injury from frost. Tent caterpillars are doing some damage. No one sprays here so far as I know. The supply of farm help is equal to the demand and it is all good. Wages average $20 per month with board and $1.50 per day without board. The acreage of farm crops is about the same as usual and there are no new enterprises in agriculture.

Belchertown (H. C. West).— The season is fully up to the average. Pastures and mowings promise fairly well and fall seeding wintered well. The fruit bloom was very full and it has not suffered from frosts. Spraying is very little practised as yet, but has got to come and is increasing. Farm help is not plenty and one in four is good help. Wages are from $15 to $18 per month with board and from $1.25 to $1.50 per day without board. The acreage of potatoes will be increased. The only new enterprise hereabouts is the plowing of bog meadows, converting worthless wastes into No. 1 mowing lands at comparatively small expense.

Amherst (Wm. P. Brooks).— The season is some weeks later than usual. Pastures and mowings everywhere give good promise, but new seeded clover wintered poorly. The fruit bloom was late but very abundant; damage in this immediate vicinity slight, but in some localities serious; strawberries much injured. Tent cat-

erpillars are doing some damage. Spraying is very generally practised by large fruit growers and some small growers hire it done. Farm help is plenty and good men are easily obtained by offering good wages. Wages range from $12 to $21 per month with board and from $29 to $40 per month without board. Tobacco will be more largely grown than formerly. The rain of Friday and Saturday practically assures a good hay crop.

Hadley (H. C. Russell).—The season is very late and there is not much corn planted. The promise for pastures and mowings is excellent. The fruit bloom was the heaviest for years and the damage from frost was very slight. No insects have appeared as yet. Spraying is not much practised but is on the increase. Farm help is scarce and one-fourth of it is good help. Wages are $20 per month with board and $1.50 per day without board. There will be a small increase in the acreage of tobacco.

Hatfield (Thaddeus Graves).—The season is cold and backward. Pastures and mowings promise well and fall seeding wintered well. The fruit bloom was excellent, but it suffered somewhat from frost. No insects are doing damage, probably because of the cold weather. Spraying is not practised here. Farm help is plenty, but hardly any of it is really good help. Wages average $20 per month with board and $32 per month without board. There will be no great changes in the acreage of farm crops.

Williamsburg (F. C. Richards).—The season is about ten days late. Pastures are coming on well and mowings look well, though slightly winter-killed. The fruit bloom of all kinds was very full, but cherries, plums and peaches were destroyed by the late frosts. Spraying is not much practised and is not increasing. Farm help is very scarce and not one-fourth of it is good help. Wages are from $15 to $20 per month with board and from $25 to $35 per month without board. There are no marked changes in the acreage of farm crops.

Huntington (H. W. Stickney).—The present season is fully as promising as usual. I have never seen the prospect for a good grass crop more promising. No insects have appeared as yet. Spraying has never been practised here very much. Good help is scarce but there is plenty of poor help. Wages are from $15 to $16 per month with board. More of our farmers have gone into raising vegetables than formerly.

Middlefield (J. T. Bryan).—The season is ten days later than usual. Grass lands started slowly, but are now looking finely. Fruit trees are blossoming abundantly with no injury from frost. No damage from insects is reported as yet. Very little spraying is done here. Help is very scarce, but most farmers are supplied

with good local help. Wages average $20 per month with board and $1.50 per day without board. There will be a slight increase in the acreage of corn.

HAMPDEN COUNTY.

Tolland (E. M. Moore). — The present season has been cold and backward and is about a week later than usual. Pastures are looking well; mowings winter-killed in spots by ice. Apples and pears are in full bloom, and the freeze did not hurt them much. Spraying is not practised to any extent in this locality. Farm help is scarce and but a small proportion can be called good help. Wages are from $18 to $20 per month with board and $1.25 per day without board. I have noticed no marked changes in the acreage of farm crops and no new enterprises in agriculture.

Blandford (E. W. Boise). — The season is very near the normal, perhaps a few days late. Pastures and grass lands are in extra good shape. Fruit trees are now in bloom, and with the exception of peaches the bloom is unusually full and the prospect excellent. Very little spraying is done, but more will be done this season than ever before. Farm help is scarce and not one-fourth of it good help. Wages are from $20 to $25 per month [illegible] to $1.25 per day with board, and from $1.50 to $1.75 per day without board. Farm crops will be about as usual except that more forage crops will be put in.

Russell (E. D. Parks). — The season is rather backward, but is otherwise up to the average. The promise for pastures and mowings is good at present, and fall seeding wintered fairly well. Apples bloomed very full; frost injured peaches and cherries. Tent caterpillars have appeared. Spraying is practised to some extent and is rather on the increase, with good results. Farm help is scarce, and not more than half of it is good help. Wages are from $.75 to $1 per day with board and about $1.50 per day without board. There will be no marked changes in the acreage of farm crops.

West Springfield (J. N. Bagg). — The season is somewhat backward. The promise for pastures and mowings is good and fall seeding wintered well. The fruit bloom was very good and was not seriously injured by frosts. No insects have appeared as yet. Spraying is not much practised and there is no increase of it. Farm help is scarce and the proportion that can be called good help is small. Wages range from $1 to $1.50 per day without board. There are no marked changes in the acreage of farm crops.

Chicopee (R. W. Bemis).— The season is about a normal one. Pastures and mowings look well, and fall seeding wintered well. The fruit bloom was quite heavy, and the frosts have not affected any fruit excepting the peach, if they have it to any great extent. Tent caterpillars are doing some damage. Very little spraying is done in this vicinity. Good help is scarce and we have to depend on Polish or French help. Wages are from $15 to $25 per month with board and from $1 to $1.50 per day without board. There are no marked changes in acreage of farm crops and no new enterprises in agriculture.

East Longmeadow (J. L. Davis). — The season is above the average except for early market garden crops. Pastures and mowings are coming on well; new seeding washed badly last winter. There was a full fruit bloom, with no damage from frost. A few farmers spray, but not many know much about it. Help is scarce and there is no first-class help. Wages are from $15 to $22 per month with board and $1.50 per day without board. There will be quite an increase in the acreage of potatoes.

Wilbraham (H. M. Bliss). — The season is backward, but is otherwise fairly good. Pastures and mowings are in good condition, but fall seeding winter-killed on low lands. There was a very full fruit bloom and the severe frosts did very little damage. Bud moths are doing some damage. There is very little spraying done and it is not increasing. Farm help is scarce, and about half is good help. Wages range from $12 to $18 per month with board and are about $1.25 per day without board. There are no marked changes in the acreage of farm crops, and no new enterprises in agriculture.

Holland (Francis Wight). — The season is rather backward. Pastures and mowings are not over promising; not much fall seeding was done last year. The fruit bloom is fully up to the average and has not suffered from frosts. Tent caterpillars are doing some damage. Spraying has not been practised much, but is on the increase. Farm help is scarce, but most of it is good. Wages are $1 per day with board and $1.50 per day without board. There are no particular changes in the acreage of farm crops.

WORCESTER COUNTY.

Warren (W. E. Patrick). — The season is backward, but otherwise favorable. Pastures and mowings promise well and fall seeding is looking finely. There was a very full bloom of apples, pears, plums and cherries, and a medium one of peaches, but it was injured by frost to some extent. No insects have appeared as

yet. But few make a practice of spraying, but it is on the increase. Farm help is scarce and possibly half of it is good help. Wages average $20 per month and $1.50 per day. There is no marked change in the acreage of farm crops.

North Brookfield (J. H. Lane). — The season is backward, but there is plenty of time. Pastures and mowings promise well and fall seeding wintered well. The fruit bloom is abundant and safe from frost, so far, seemingly. It has been too cold for insects. Spraying is not practised and there is not much increase. Farm help is scarce and not over 10 per cent of it is good help. Wages are from $15 to $17 per month with board and from $1.25 to $1.75 per day without board. There will be no marked changes in the acreage of farm crops and no new enterprises in agriculture.

Rutland (L. S. Dudley). — The season is about a normal one. Pastures and mowings promise well and fall seeding wintered well. Fruit trees blossomed well and I think have escaped injury from frost. Potato bugs are doing some damage. Not much attention is paid to spraying. Farm help is scarce and one in twelve good help. Wages average $20 per month with board and $35 per month without board. There are no marked changes in the acreage of farm crops, and no new enterprises in agriculture.

Hubbardston (C. C. Colby). — The season is nearly two weeks later than usual. Grass has started very slowly; many mowings badly winter-killed; fall seeding looking better than that seeded last spring. Fruit trees are in full bloom with the prospect of a full year. Very few of our farmers practise spraying, but they will have to if they want to grow fruit. Farm help is scarce and good help is almost impossible to obtain. Wages range from $20 to $30 per month with board and from $1.25 to $1.50 per day without board. There will be about the usual acreage of the regular farm crops.

Petersham (S. B. Cook). — The season is fully up to the normal. Grass is looking well in pastures and mowings; fall seeding winter-killed badly because of bare ground during the winter. Apple and pear bloom more abundant than usual; peaches suffered from late frost. But little spraying is done and it is not on the increase. A few tent caterpillars are the only insects that have appeared. Farm help is scarce and one third of it is good help. Wages range from $12 to $15 per month with board and from $20 to $28 per month without board. The acreage of common crops is about the same as usual. Market gardening and raising small fruits is on the increase. There is a marked interest in the dairying business and the number of cows is increasing.

Templeton (Lucien Gove). — The season so far has been unusually cold and backward. Pastures are backward and not up to the average; mowings the same; fall seeding wintered well as a rule though late sown did not. The prospect for fruit is favorable; apple trees not yet in bloom. It has been so cold that insects have not been troublesome. Spraying is but little practised and is taken up very slowly. Farm help is more difficult to get this year than ever; about 20 per cent can be classed as good. Wages range from $18 to $25 per month with board and from $1.25 to $1.50 per day without board. The tendency is towards raising increased amounts of forage crops as a substitute for the hay crop.

Ashburnham (Albert Needham). — The season is rather backward. Pastures are looking well, but mowings winter-killed somewhat. Fruit trees are not yet in bloom except pear, plum and cherry, but the bloom is likely to be a full one. Tent caterpillars are doing some damage. Spraying is practised but little. Help is hard to get. Wages are from $20 to $25 per month with board and $1.50 per day without board.

Fitchburg (Jabez Fisher). — The season is a day or two later than the average of 44 years, in other repects an average. The winter has been very favorable for grass and vegetation of all kinds. Apples made a very full bloom, pears fair, other fruits good; frost did some damage to all, but it was in very few instances extensive. There are a few tent caterpillars and bud moths. A few practise spraying considerably and the tendency is for a slight increase. Good help is scarce and poor plenty. Wages average $20 per month with board and $1.50 per day without board. There are no changes of note in the acreage of farm crops.

Bolton (H. F. Haynes). — The season is a fair one. Pastures and mowings promise well; some late seeded fields winter-killed but fall seeding generally wintered well. There was a full fruit bloom, but it was badly injured by frost. Canker worms are doing some damage. There is more spraying this season than ever before. Farm help is scarce, three-fourths of it is good help in this section. Wages range from $20 to $25 per month with board and are about $1.50 per day without board. There are no particular changes in the acreage of farm crops.

Worcester (H. R. Kinney). — The season has been rather later than the average. Grass does not look as well as usual. There has been a full bloom on fruit trees, but it was badly damaged by frost. Tent caterpillars are numerous but have not grown fast on account of the cold weather. Spraying is not generally practised and is not given enough attention. Farm help is not plenty and I think

there is not as much good help as usual. Wages are from $18 to $25 per month with board and from $1.25 to $1.50 per day without board. There seems to be nothing new here, milk is the principal line of business with a few raising fruit and vegetables.

Oxford (D. M. Howe).— The season is above the average agriculturally speaking. Pastures and mowings promise well and fall seeding wintered well. Apples made a full bloom and I think escaped the frosts. Tent caterpillars have made their appearance. Spraying is not very much practised here. Farm help is scarce and good hands are very hard to find. Wages are from $18 to $20 per month with board and from $30 to $35 per month without board. There are no marked changes in the acreage of farm crops.

Uxbridge (Augustus Story).— The season is very favorable, though planting is somewhat late owing to cold weather. Pastures and mowings are in very good condition and fall seeding wintered very well. The fruit bloom was very full; peaches suffered from the frosts. Canker and currant worms are doing some damage. Spraying is not much practised and there has been no increase. Farm help is very scarce, and not one in thirty is good help. Wages range from $12 to $20 per month with board and from $25 to $40 per month without board. There are no marked changes in the acreage of farm crops. A private creamery owned by an enterprising farmer has just started.

Hopedale (Delano Patrick). — The season is favorable but rather backward. Fall seeding is a partial failure. Apple trees were never in fuller bloom and were not injured by frost. There are some tent caterpillars as usual. Spraying is not much practised and I think is not increasing. Farm help is scarce and only a small per cent of it is good help. Wages are $1.50 per day without board. There is no particular change in the acreage of farm crops and nothing new in the line of agriculture.

MIDDLESEX COUNTY.

Sherborn (N. B. Douglas). — The season is about ten days late. Pastures and mowings both winter-killed somewhat; fall seeding wintered well. I never saw a heavier fruit bloom and cannot yet tell the extent of the damage from frost. Insects have not yet gotten down to business. Considerable spraying is done, but no more than last year. One-third to one-half of our farm help can be called good help. Wages range from $18 to $20 per month with board and are about $1.50 per day without board. Things jog along in about the usual way with very few changes.

Marlborough (E. D. Howe). — The season is a normal one.

Recent rains are making pastures and mowings look finely; fall seeding washed badly during the winter. Trees of all kinds are overloaded with blossoms and there has been no damage by frost. Tent caterpillars are our only insect thus far. About half our farmers spray more or less and the practice is slowly increasing. The supply of farm help equals the demand and one-third of it is fairly good. Wages are from $20 to $25 per month with board and from $9 to $10.50 per week without board. There is a growing tendency to plant more forage crops.

Maynard (L. H. Maynard). — The season is about a normal one. Pastures and mowings look well; late fall seeding looks unusually well; some mowings winter-killed by reason of bare ground and ice. Asparagus beetles and cut worms are doing some damage. Spraying is practised by a few and I do not think it is increasing. Good farm help is scarce. Wages are from $15 to $20 per month with board and from $1 to $1.25 per day without board. There are no marked changes in the acreage of farm crops and no new enterprises in agriculture.

Westford (J. W. Fletcher). — The season is rather backward. Pastures and mowings are in good condition and fall seeding never looked better. I do not think I ever saw fruit trees bloom so full. Tent caterpillars are the only insects doing damage and they are not very plenty. Spraying is not much practised. Good farm help is scarce. Wages are $20 per month with board and from $35 to $40 per month without board. The acreage of farm crops will be about the same as usual.

Dunstable (A. J. Gilson). — The season is somewhat later than usual but the outlook is promising. The promise for pastures and mowings is very good and fall seeding wintered well. The fruit bloom is above the average and only the earlier varieties suffered from frost. No insects are doing damage now. Very little spraying is done and it is not on the increase. Farm help is scarce with a fair proportion good help. Wages are about $20 per month with board and from $28 to $32 per month without board. There are no changes to note in the acreage of farm crops and no new enterprises in agriculture.

Bedford (Henry Wood). — The season is very cold and seeds do not germinate well. Fall seeding looks well, but grass winter-killed somewhat. The fruit bloom never looked better and I think it did not suffer from the late frosts. A few canker worms have appeared. There are a few who spray, about the same number as last year. Farm help seems plenty, but not reliable in many cases. Wages range from $15 to $22 per month with board and from $35 to $40 per month without board. The acreage of farm crops will be about the same as usual.

Lincoln (Samuel Hartwell). — The season is about a normal one. The promise for pastures and mowings is excellent and fall seeding is in fair condition. The fruit bloom was much heavier than in most years, but it has suffered from frosts. No insects are doing damage as yet. Spraying is practised to only a small extent and does not appear to be on the increase. Farm help is rather scarce, perhaps one-fourth may be called good. Wages average $20 per month with board and $35 per month without board. There are no marked changes in the acreage of farm crops.

Woburn (W. H. Bartlett). — The season is two weeks later than the average. Grass is now looking well but has made slow growth. There is an extra heavy bloom on all fruit trees; possibly some damage by frost to peaches and currants. There is some spraying in this vicinity and it is on the increase. Farm help is scarce, and good help is almost impossible to get. Wages are $1.50 per day without board. The acreage of farm crops is about the same as usual. Small fruits do not pay us and several have dug up their bushes. The cold of the 10th and 11th injured some tomatoes, strawberries, asparagus, corn and beans. We are now hoeing peas, lettuce, spinach, radishes, etc.

Winchester (Marshall Symmes). — The season is about two weeks later than the normal. The promise for pastures and mowings is good, and fall seeding wintered well. There was a great bloom on all fruit trees and the frost did little damage. Very little spraying is done here. It is too cold for insects and very few are in sight. There is plenty of ordinary help, but the best help is scarce. Wages are about $20 per month with board and from $8 to $10 per week without board. Ploughed fields suffered during the winter by being washed and gullied.

Wakefield (Chas. Talbot). — The season is a very favorable one. Pastures and mowings were never in better condition; fall seeding did not take very well. The fruit bloom was never equalled in this section, and peaches were the only kind injured by frost. Tent caterpillars are doing some damage. Spraying is very generally practised, but there has been no increase for the last few years. Farm help is scarce and most of it of poor quality. Wages are from $12 to $18 per month with board and from $35 to $40 per month without board. There will be no marked changes in the acreage of farm crops.

ESSEX COUNTY.

Amesbury (F. W. Sargent). — The season is backward; spring work well in hand, but warmer weather and sunshine is needed.

Recent rains will start mowings; sun and warmth is needed for pastures; fall seeding wintered poorly. All fruits had a full bloom. No insects but tent caterpillars are in sight as yet. Spraying is not extensively practised and is not increasing. Farm help is in moderate supply and of fair quality; about one-half can be called good. Wages average $20 per month with board and $40 per month without board. The acreage of farm crops is about the same as usual; nothing new in agriculture.

Haverhill (Eben Webster). — The season is a little more backward than usual. Pastures are quite good; mowings winter-killed somewhat; fall seeding in fair condition. Apples, pears, plums and cherries made a large bloom and the frost did not do much damage. No insects have appeared as yet. Spraying is practised to a slight extent, and there is not much increase. Farm help is plenty, and half of it is fair to good. Wages are from $18 to $20 per month with board and $1.50 per day without board. There is no marked change in the acreage of farm crops.

North Andover (Peter Holt, Jr.). — The season is cold, late and wet. Pastures are looking well; fall seeding is good, especially that which was put in late. All kinds of fruit made a full bloom. No insects have appeared as yet. Very few of our farmers spray. Help is scarce, but perhaps half is good help if you don't set the standard too high. Wages are $20 per month with board and $1.50 per day without board. There will be about the usual acreage of the ordinary farm crops; this is a milk raising section and mostly fodder crops are raised.

Newbury (G. W. Adams). — The season is very late and cold. Pastures, mowings and fall seeding wintered fairly well. There appears to be a very full fruit bloom, which was not greatly injured by frost. Caterpillars and canker worms are doing some damage. Perhaps half our farmers spray and the practice is increasing very slightly. Decent help is very scarce; perhaps 3 per cent are good help but their price is excessive. Wages range from $16 to $26 per month with board and $1.50 per day without board. There are no marked changes in the acreage of farm crops and no new enterprises in agriculture.

Ipswich (O. C. Smith). — The season is backward because of the cold nights. Some fall seeding winter-killed; pastures are coming on well; the hay crop will be an average one. The frost did no damage except to peaches; pear and apple bloom above the average. Tent caterpillars have hatched out, but are not as numerous as usual. Spraying is quite general and is gradually increasing. Help is rather scarce; good help most so; not over one-third is good help. Wages range from $18 to $22 per month

with board and from $1 to $1.50 per day without board. Staple crops will have about the usual acreage; more fodder crops are being sown than usual.

Danvers (C. H. Preston). — The season is late at present. Pastures and mowings are in good condition, and fall seeding wintered well. The fruit bloom was very full, but was injured by late frosts. Tent caterpillars are doing some damage. Spraying is largely practised and is on the increase. Farm help is scarce. Wages average about $20 per month with board and about $35 per month without board. There will be no marked changes in the acreage of farm crops. Many crops will have to be replanted owing to the heavy rains; potatoes and early corn suffered most.

NORFOLK COUNTY.

Franklin (C. M. Allen). — The dry weather last season left all grass roots weak. There was an immense fruit bloom of most fruits. Very few insects have put in an appearance as yet. Spraying is but little practised with perhaps a small increase. Farm help is scarce and not above 15 per cent of it is good help. Wages average $20 per month with board and $1.50 per day without board. The acreage of hay and grain grows less and that of fruit and garden crops greater.

Norfolk (Geo. E. Holbrook). — The season is very backward except for fruit trees. Pastures are doing well and mowings look well, with the exception of some winter-killing. Peach trees suffered badly from frost; apples show a heavy bloom. No insects have appeared as yet. Hardly any one is spraying. Good help is scarce, but there is poor help enough. Wages range from $15 to $20 per month with board and from $25 to $40 per month without board. There is no change to speak of in the acreage of farm crops.

Canton (E. V. Kinsley). — The season is a good average one. Pastures and mowings look remarkably well; seeding done very late in the fall but wintered well. There was a very full fruit bloom; cherries, peaches and strawberries suffered in some localities by the frosts of the 10th and 11th. No insects have appeared except a few tent caterpillars. Very little spraying is done but some attention is being given to the subject. Farm help is rather scarce; good help very scarce; one eighth perhaps good help. Wages are from $15 to $18 per month with board and $1.50 per day without board. The paramount interest of every farmer in this section is the production of milk for family use, probably 600 cows being kept in this town to supply retailers.

Randolph (R. A. Thayer). — Crops are growing very slowly and the season is late. Pastures and mowings promise well, but fall seeding did not winter well. There is a full bloom on all fruit trees; cherries and peaches injured by frost. No insects have appeared as yet. There is a very limited amount of spraying in this vicinity. There is plenty of help and about a third of it is good help. Wages are from $18 to $20 per month with board and from $30 to $35 per month and $1.50 per day without board. Early peas and potatoes are coming on nicely.

Cohasset (E. E. Ellms). — The season is a good one. The promise for pastures and mowings is excellent and fall seeding wintered well. The fruit bloom is very heavy. Tent caterpillars are doing some damage. Spraying is on the increase. Help is scarce and about one tenth of it is good help. Wages average $20 per month with board and $45 per month without board. There will be no marked changes in the acreage of farm crops.

BRISTOL COUNTY.

Mansfield (Wm. C. Winter). — The season is a few days later than usual with unusually late frosts. Pastures and mowings look well; fall seeding injured by spring frosts. The fruit bloom was a good average, but suffered badly from frosts; cherries and Japan plums were ruined, apples and pears badly damaged. Currant worms and potato bugs are doing some damage. Spraying is practised to a small extent and will be somewhat increased this year. There is enough good farm help to meet the demand. Wages average $20 per month with board and $1.50 per day without board. The acreage of farm crops will be about as usual; no new enterprises in agriculture.

Attleborough (Isaac Alger). — The season is an average one. Pastures and mowings are in good condition and fall seeding wintered well. Strawberries have been seriously injured by frosts; other fruit bloom abundant. There are no insects as yet. Spraying is not practised. Farm help is plenty and half of it good help. Wages are $20 per month with board and from $30 to $35 per month without board. There will be little change in the acreage of farm crops. Oats and winter rye are looking well.

Berkley (R. H. Babbitt). — Crops are late on account of cold weather. Pastures are coming forward fairly well, but many meadows both new and old are looking poorly. The fruit bloom is fully up to the average and the injury from frost is slight. Tent caterpillars are doing some damage. Farm help is scarce and less than half of it is good help. Wages are $18 to $20 per month

with board and $1.50 per day without. The acreage of farm crops will be fully up to former years.

Swansea (F. G. Arnold). — The season is very favorable. Pastures and mowings look well. Fruit trees are blooming well; the frosts of the 10th and 11th injured peach buds. Tent caterpillars are doing some damage. Very little spraying is being done. Wages are $20 per month with board and from $1.25 to $1.50 per day without board. Owing to the short hay crop of last year a larger acreage of millet and fodder corn will be planted.

Westport (A. S. Sherman). — The season is about an average one. Pastures look finely; mowings promise very well; fall seeding in good condition. All kinds of fruit trees bloomed abundantly, but the peach crop suffered from frosts. No insects have appeared as yet. Very few practise spraying, but those who have done so speak well of it. Farm help is plenty and one fourth of it good help. Wages average $20 per month with board and $1.50 per day without board. The culture of all kinds of grain is on the decline. Hay and the production of milk is the principal industry.

Acushnet (M. S. Douglas). — The season is a fair one at present. Pastures are in good condition and mowings excellent; fall seeding wintered well. Asparagus beetles and tent caterpillars have made an appearance. Spraying is little practised, but is on the increase here. Farm help is plenty but not experienced. Wages are from $18 to $20 per month with board and from $1.25 to $1.50 per day without board. Farmers in this vicinity are largely interested in market gardening and poultry, together with small fruits.

PLYMOUTH COUNTY.

Brockton (Davis Copeland). — The season is about a week late. The apple bloom was very full but it was injured somewhat by frost. The green plant louse is doing considerable damage to lettuce and tomatoes. Very little spraying is done. Good help is scarce but there is plenty of poor help. Wages are about $20 per month with board and $1.50 per day without board.

Hanson (F. S. Thomas, M.D.). — The season is cold, backward and wet. Pastures and mowings promise well, and fall seeding wintered well. The fruit bloom was the best in years but suffered somewhat from frost. Tent caterpillars are doing some damage, but not much. Very little spraying is done. Farm help is plenty and most of it is quite good. Wages are from $1.50 to $2 per day without board. There will be no marked change in the acreage of the usual farm crops.

Bridgewater (Rowland Cass). — The season is somewhat later than usual. Pastures and mowings are in good condition, and early fall seeding is also in good condition. The strawberry bloom was injured by frost; apple trees bloomed full; pears about 65 per cent; neither appear injured; peach bloom practically all killed. Tent caterpillars are the only insect at present. Spraying is not practised in this locality. There is enough farm help for present needs, and three-fourths of it is good help. Wages are $18 per month with board and $1.50 per day without board. More potatoes than usual will be grown, but there are no new enterprises.

Lakeville (N. G. Staples). — The season is rather backward. Pastures and mowings are looking well, and fall seeding wintered well. There is an abundant bloom of all kinds of fruit; peaches and strawberries have suffered from frost. Tent caterpillars have done some damage. Spraying is practised to a limited extent but is on the increase. Farm help is scarce, but nine-tenths of it is good. Wages are $18 per month with board and $1.50 per day without board. There are no changes in the acreage of farm crops and no new enterprises in agriculture.

Carver (J. A. Vaughan). — The season is later than usual. Pastures and mowings are in fair condition. There was a full fruit bloom, but nearly all the peach, some pear and many strawberry blossoms were killed by frost. No insects have appeared as yet. Spraying is on the increase and many cranberry bogs will be sprayed this year. Wages are $18 per month with board and $1.50 per day without board. There are no marked changes in the acreage of farm crops.

BARNSTABLE COUNTY.

Falmouth (D. R. Wicks). — The season is a week or ten days later than usual. Pastures and mowings are in fine condition, and fall seeding wintered well. The fruit bloom is the heaviest for years; strawberries somewhat injured by frost. The tent caterpillar is the only insect to appear as yet. No spraying done here as yet. There is no help here except foreigners. Wages are $25 per month with board and $1.50 per day without board. There are no marked changes in the acreage of farm crops.

Sandwich (J. R. Holway). — The season is very cold and most crops are backward. Pastures poor, mowings fair and fall seeding in average condition. The fruit bloom was very heavy on all varieties. Considerable spraying is done on cranberry bogs and it is increasing every year on fruit trees. Farm help is rather scarce, and good help is hard to get. Wages are from $15 to $20

per month with board and $1.50 per day without board. There are no marked changes promised in the acreage of farm crops.

Barnstable (John Bursley). — The season is ten days late. Pastures and mowings are in good condition, but fall seeding wintered poorly. The fruit bloom is average, but strawberries were injured by frost. Tent caterpillars are doing some damage. One-fourth of our cranberry bogs are sprayed and 5 per cent of our orchards. Farm help is scarce, and not over 25 per cent of it is good help. Wages are $22 per month with board and 17 cents per hour without board. There will be no marked changes in the acreage of farm crops.

Dennis (Joshua Crowell). — The season is perhaps a little backward. The promise for pastures and mowings is fair, much better than last year, and fall seeding wintered well. The fruit bloom was fully up to the average with no damage from frosts. Not many insects have appeared as yet. Spraying is practised mostly for the cranberry worm and is increasing. There is a fair supply of farm help. Wages are $25 per month with board and $35 per month without board. There will be no marked changes in the acreage of farm crops and no new enterprises in agriculture.

Wellfleet (Everett Jacobs). — The season is very encouraging at present. Pastures and mowings promise well. Orchards have just commenced to bloom and are looking finely. Tent caterpillars are doing some damage. Very little spraying is done in this section. Good help is scarce. Wages $20 per month with board. There is no change in the acreage of the usual farm crops.

DUKES COUNTY.

West Tisbury (Geo. Hunt Luce). — The season is late in most respects. The promise for pastures and mowings is above the average. Some of our fruit trees show a very heavy bloom, but it is not general; no damage from frost. No insects are doing damage at present. Spraying is not practised to a very great extent but is on the increase. The supply of farm help is about equal to the demand and perhaps one-fourth of it is good help. Wages are from $10 to $30 per month with board and $1.50 per day without board. The acreage of farm crops will be about the same as usual in all respects.

BULLETIN OF

MASSACHUSETTS BOARD OF AGRICULTURE.

SOME INSECTS INJURING MARKET GARDEN CROPS.

By Prof. H. T. FERNALD, *Professor of Entomology, Massachusetts Agricultural College.*

Market gardening in Massachusetts is an important industry. Created by the growth of cities it must increase as they do, in order to supply their inhabitants with the vegetable necessities of life. The successful market gardener is but a short distance from his market, and in consequence, one of the first indications of nearness to the city a traveller sees on approaching it, is a marked increase in the amount of cultivated land and of greenhouses. In fact the market gardens supplying a city, surround it in a broad and often almost continuous belt.

The continuous acreage of crops thus produced is directly favorable to the rapid increase of those insects which attack the different kinds of market garden crops, and as this industry grows larger, we must expect an increased amount of injury from insect pests. Some of the more common of these and the most successful methods for preventing loss by them are here considered.

THE ASPARAGUS BEETLE.

(*Crioceris asparagi* Linn.)

This too familiar insect was introduced into New York from Europe about 1856, and is now generally distributed over the eastern United States. It passes the winter as the adult beetle, hiding in any protected place. In the spring, about the time the asparagus begins to appear above ground, the beetles leave their hiding places and lay their eggs on the young shoots of the plant. The eggs are quite large, brown in color, and attached by one end to the plant. They are laid separately, but often quite close together in rows, and when abundant are very noticeable on the asparagus tops. They hatch in from three to eight days, producing little gray "grubs" with black heads. Each grub feeds until

full-grown, which takes from ten days to two weeks, after which it leaves the plant, enters the ground and forms a small, rounded cocoon within which it remains quiet for about a week, during which time its structure is changing to that of the adult beetle. When this change is completed the beetle escapes to feed, mate and lay eggs for the next brood. This brood has the same history as the last, and it is probable that a third brood is produced during the year, before cold weather drives the beetles into their winter quarters.

FIG. 1.—The asparagus beetle: *a*, adult beetle; the line beside it shows the real length of the beetle. On the right a branch of asparagus, showing eggs, grubs and beetles, natural size; also an asparagus tip with eggs, and places eaten out. (*From Chittenden, Yearbook, Dept. Agr., 1896.*)

The adult beetle is rather less than a quarter of an inch long, with a black head, red thorax, and yellow and dark blue wing covers, the blue forming a stripe along the middle of the back, crossed near its middle by another of the same color and by a similar one near the hinder end of the body. Along the sides of the back the color becomes reddish.

Injuries and Treatment.

Injury to asparagus is caused both by the grub and the adult beetle feeding upon the shoots intended for market, and also upon the full-grown plants.

For beds where cutting is done, a few shoots left here and there to serve as traps will attract the beetles to them if the other shoots are kept cut as fast as they grow to market size. The trap shoots should be cut about once a week and destroyed, others being then allowed to take their places. If this be continued for four or five weeks the egg supply of the beetles which winter over will be about exhausted, and if no young have found a chance to develop on volunteer asparagus near, the danger of damage from the later broods of the season will be greatly reduced.

In the case of seed beds, dusting with fresh air-slaked lime while the dew is on is quite effective, as the lime kills every grub it touches. That it is only those grubs which are touched by the lime which are killed, however, should be remembered by those who use this method. Allowing chickens to run in the asparagus beds is advantageous, as these feed freely upon the insects. Cutting down and burning the seed stems two or three times a year is also a good practice and is now considered not to be injurious to the plant. Finally, several kinds of insects prey upon the asparagus beetle and aid the grower to keep this pest in check.

The Imported Cabbage Worm.

(*Pieris rapæ* Schr.)

This insect like the asparagus beetle is a native of Europe and made its appearance in this country near Quebec about 1859, since which time it has spread over nearly the entire United States.

Fig. 2.— Imported cabbage worm butterfly: male and female.

The insect passes the winter as a brown chrysalis, attached to some board, fence-rail or other object. In the spring the chrysalis bursts open, setting free the white butterfly so common around cabbage fields in summer, and as soon as the cabbages are set out,

the butterflies begin to lay their eggs on the leaves, one in a place. The eggs are rather smaller than the head of a pin, pale yellow at first, but darker after a few days. They hatch in about a week, and the little caterpillars which come from them at once begin to feed on the leaves. At first pale yellow, the caterpillar as it grows becomes velvety green, and when full-grown is more than an inch long. It now crawls to some protected place where it changes to the chrysalis form — the same as that in which the winter is passed — and becomes quiet while the internal organs of the caterpillar are being built over into those of the adult butterfly. When these changes have been completed the chrysalis bursts open and the adult butterfly appears, and egg-laying for another brood of caterpillars now begins. During the year there are three broods of these insects in Massachusetts, the winter being passed in the chrysalis stage.

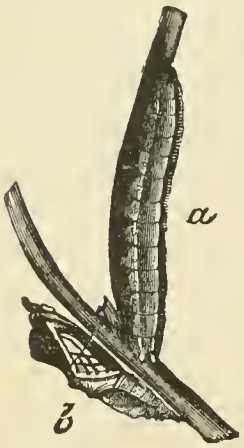

Fig. 3. — Imported cabbage worm: *a*, full-grown caterpillar; *b*, chrysalis.

Treatment.

Several methods may be used for controlling this insect. Hot water applied at about 130° will kill the caterpillars usually without injuring the plants, but the disadvantage of this treatment upon a large scale is evident.

Probably the best method to use is that of spraying with Paris green or Arsenate of lead, as these poisons are very destructive to the caterpillars and without danger to the consumer unless the spraying be done with extreme carelessness and shortly before the heads are cut. There are several reasons why this treatment is not dangerous. The head of the cabbage forms from within, only the very outermost leaves being at any time exposed to the poison, and these are removed in trimming the head for market. Then too, the poison is chiefly needed on the outside leaves of the plant where most of the caterpillars occur, and these leaves are never cut with the head. Chemical analysis of heads heavily sprayed one week before cutting showed that not a trace of arsenic remained. Finally, if spraying be carefully done when the caterpillars first appear in spring and followed up until the head appears, the insect will in all probability be so reduced in numbers that spraying after the head is a quarter grown will be unnecessary, thus removing the last possibility of danger.

This treatment for the cabbage worm is the usual one among

some of the largest market gardeners in the country, and no case of arsenical poisoning from eating cabbage treated in this way has ever been reported.

Other substances, such as alum, copperas and saltpetre, have been recommended for use against this insect but are of no value.

Recently a new treatment has been brought forward by the New York Agricultural Experiment Station as being better than that recommended above. The material used is known as the Resin-lime mixture, and is prepared as follows :—

Stock solution : —	Pulverized resin, ...	5 lbs.
	Concentrated lye, ...	1 lb.
	Fish or any cheap animal oil except tallow,	1 pint.
	Water, ...	5 gals.

Place the oil, resin and one gallon of hot water in an iron kettle ; heat till the resin is softened, then carefully add the solution of concentrated lye (prepared by the directions for making hard soap always given on the can) ; stir the mixture and add the other four gallons of water, hot; now boil till the mixture will unite with cold water and make a clear, amber-colored liquid ; now add water enough to make up five gallons.

With this as a stock solution, to spray take :

Resin lime prepared as above, ...	1 gal.
Water, ...	16 gals.
Milk of lime, ...	3 gals.
Paris green, ...	1-4 lb.

Bring these together in the order in which they are named, adding the Paris green last, stir thoroughly, and spray the plants. Do not prepare the spraying solution mixture, however, till ready to use it, as it settles on standing.

This treatment has been used with good success, and with reference to it the following statements are made : First, that by it late cabbage and cauliflower can be protected from the attacks of the cabbage worm and cabbage looper by two sprayings. Second, that in the case of cabbage the yield can be increased sixty per cent to one hundred per cent. Third, that the cost per acre will depend on the number of acres sprayed, the cost of spraying ten acres twice being $20. Fourth, that the mixture must not be applied to cabbage after the heads are two-thirds grown, nor to cauliflower after the "flower" appears. Fifth, that only skilled workmen should be permitted to spray cauliflower.

In view of the amount of work necessary to prepare this mixture, and the amount of care necessary, as indicated by these last two statements, it becomes questionable whether the advantage gained

by using it — a more thorough adherence of the spray to the leaves — is sufficient to pay for the extra expense and trouble. In any case it is most likely to be of value where the acreage of cabbage is very large.

The Squash Bug.

(*Anasa tristis* DeG.)

The squash bug is a familiar insect in this country on squashes, melons and other cucurbits. The adult bugs pass the winter in any protected places they may find, and, in the spring after the squashes are well up, lay their eggs on the under side of the leaves. The eggs are light reddish brown in color and very noticeable on the leaves. They hatch in a little more than a week, producing small green and black young somewhat resembling the adult, but without wings. These young keep quite close together on the under side of the leaves at first, but before long work toward the stems, all the time sucking the juices from the plant. They feed in this way and grow for about a month, the insects changing in appearance from time to time as they throw off their outgrown skins, till finally after the last of these molts the changes brought about in this way produce the full-grown adult bugs which proceed to lay eggs for a second brood. These develop in a similar manner and many of this brood have become adult by the time cold weather approaches, when they leave the plants to seek protected places in which to pass the winter.

Fig. 4.—Squash bug: adult bug, natural size.

Treatment.

This insect does not lend itself readily to treatment. No stomach poison is of any use, as both the young and adult only suck the juices of the plant, and contact poisons such as kerosene fail to kill any except the youngest, unless used so strong as to destroy the vines. Under these circumstances other methods must be resorted to.

It is evident that if all the bugs which pass the winter could be destroyed no spring brood could be possible. As to do this is impracticable, however, efforts should be made to reduce their numbers as much as possible. At all times, but particularly when the nights begin to grow cool in the fall, these insects tend to leave the plants towards dark each evening and seek protection under fallen leaves, sticks, pieces of board, etc., on the ground. If shingles or pieces of bark be placed near the plants at such

times an early visit in the morning will show many thus collected where it is easy to kill them. Burning the vines as soon as the crop has been gathered, and clean cultivation, reducing the number of places where protection during the winter may be found, also aid in reducing the number of these pests, while a frequent examination of the under side of the leaves of the plants in June and the destruction by hand of all eggs and young found, will prove to be of sufficient value to more than pay for the time required to do this.

Other methods which are of value are: the protection of young plants by coverings if the bugs appear while the plants are still small; applying land plaster well soaked with turpentine or kerosene to the ground near the stems; planting an excess of seed and forcing the rapid growth of the plant by fertilizers. All of these are of value, but unfortunately no one of the methods here suggested can be relied upon alone to accomplish the destruction desired.

The Squash-vine Borer.

(*Melittia satyriniformis* Hbn.)

The presence of this pest to squash growers is easily recognized by the sudden wilting and dying of the squash leaves during July. Its work is so rapid that frequently the wilting and death of the plants is the first indication of its presence when it is not a familiar insect to the market gardener.

The squash-vine borer passes the winter in the ground, inside a silken cocoon coated on the outside with particles of dirt. The adult moths which come from these cocoons appear around the plants during the first two weeks in July, in Massachusetts (Harris), and proceed to lay their eggs on different parts of the vines, though the stems are preferred for that purpose.

A female moth may lay over two hundred eggs scattered about in this way, and from them little caterpillars will hatch in from one to two weeks and begin to bore through the stems. Feeding inside the plant, after four weeks or more the caterpillar becomes full-grown, whereupon it leaves the stem and burrows down into the ground for two or three inches, where it forms a cocoon within which to pass the winter. In Massachusetts there is but one brood each year. Further south, however, a tendency to produce two broods is evident, and in the Gulf States there are doubtless two full broods.

Treatment.

This would be an easy insect to destroy if the caterpillar fed on the outside of the plant where some arsenical poison could be

placed. Working where it does, however, this method of treatment is not available and others must be employed instead, no one of which should be relied upon alone, but all be used together.

Fall harrowing of the fields where squashes have been grown during the summer is very effective. This brings the cocoons up from where the insects had placed themselves, to the surface where they are exposed to freezing and thawing during the winter. This, followed by plowing in spring to a depth of more than six inches, will destroy many of the insects.

Good results are also obtained by planting a few summer squashes, such as cymblins or crooknecks, as early as possible, before the main crop, and between the rows which they are to occupy. Such trap plants attract more of the borers, which leave the later varieties comparatively unmolested. Of course as soon as the crop from these trap plants has been gathered, or when the ground they occupy is needed (if later than the last of July), the vines should be raked up and burned to destroy any eggs or caterpillars they may contain.

When the borers have once attacked a vine, nothing better than cutting them out is available. If the vines be watched during July the presence of borers is soon shown by the presence of the yellowish, powdery excrement of the caterpillars which is forced out from the stem to the ground beneath. When such traces of the presence of borers are found the stem of the plant should be split lengthwise and the borers be taken out and killed, after which the split should be covered with dirt to aid in healing. If the plants have been induced to throw out roots at different points along the stems, by covering them with a little earth at intervals as they grow the injury caused by splitting the stems to get out the borers is greatly lessened.

Catching and destroying the moths as they fly about the plants has also been practised in some places with good success.

Besides the squash, the pumpkin, gourd, muskmelon and cucumber are sometimes attacked by this insect.

Striped Cucumber Beetle.

(*Diabrotica vittata* Fab.)

This insect is a general nuisance over the greater part of the United States. The black and yellow stripes along its back make it very noticeable, while the injury it causes is frequently so great as to almost prevent the raising of cucumbers at all.

About the time the young cucumber plants are just appearing above ground, and frequently even earlier, the beetles leave the

hiding places in which they have passed the winter and gather about the plants. Not satisfied to wait for these to reach the surface they often burrow into the ground to meet them and begin feeding, while as soon as the leaves appear they gather upon them and upon the stem which is often cut completely off by the insects. Later, older plants are injured by the beetles, while the young are at work at the roots.

The eggs of the beetle appear to be placed on the stalks of the plants just below the surface of the ground, and after a time each hatches, producing a little slender worm-like form which feeds on the cucumber roots and other parts of the plant which touch the ground, till full-grown when it is a little more than a quarter of an inch long. After attaining full size the grub changes in the ground into a quiet pupa which does no feeding and which remains in this condition from one to two weeks, according as the weather is warm or cold. When this period ends, the outside shell of the pupa bursts, setting free the adult beetle which proceeds to lay eggs for a second brood.

Just how many broods occur in Massachusetts is not known, but there are at least two and possibly three each year.

Treatment.

No entirely successful method for holding this insect in check has as yet been found. In several ways, however, their ravages may be lessened at small expense. Where practicable, covering the hills with netting before the plants appear is of value, as by the time the plants are too large for the nets, they have attained a size sufficient to enable them to withstand the injuries caused by insects, better than those just starting. A convenient form of netting cover is made by taking two pieces of board about six inches wide and long enough to reach the plants of the hill. To the middle of each board nail a pointed piece of lath in such a way that when the lath is driven into the ground the board will stand on edge and form one side of a box. Two such pieces may be placed at any desired distance apart, and cheese cloth be tacked on so as to form the top and the other two sides of the box. The chief advantage of such boxes is that on putting them away at the end of their usefulness, very little space is needed in which to stow them. While in use the earth should be so packed against the box as to leave no space for the beetles to crawl under and thus reach the plants.

Another treatment is to dust the plants while the dew is yet on with a mixture of Paris green, one pound, and plaster or flour seventy-five pounds, or else with air-slaked lime.

As tobacco appears to be disagreeable to these insects, considerable success has been obtained by applying tobacco dust freely to the ground around the stems of the plants and renewing the application after every rain.

The cucumber beetle feeds on the squash and melon also, and if a few squashes be planted early around the edges of the cucumber field the insect will usually devote most of its attention to them. Spraying cucumber plants with Bordeaux mixture, once as soon as the seed leaves appear, again when the third true leaf develops, and lastly when the plants begin to run, not only makes the plants distasteful to the cucumber beetle but to flea beetles, and protects them from various diseases to which they are subject.

Root Maggots.

Under this head may be included the onion maggot, cabbage root maggot, turnip root maggot, etc.

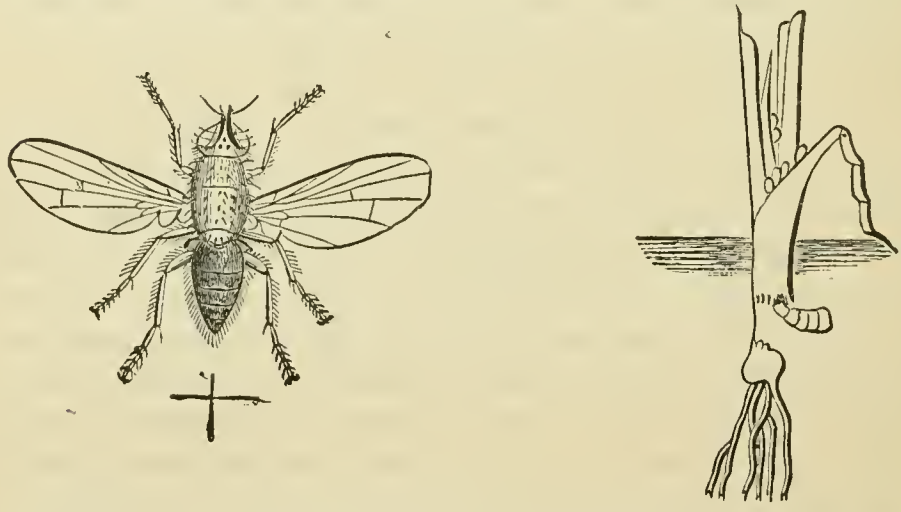

Fig. 5.—Onion maggot: adult fly at left; crossed lines below, showing natural size. Onion plant at right, showing eggs of fly and maggot working on stem below level of ground.

The adults of these maggots are flies, somewhat smaller than the house fly, which appear in spring and lay their eggs on the roots of the young plants. These eggs are smooth, white and large enough to be seen by the eye. Upon hatching, the little

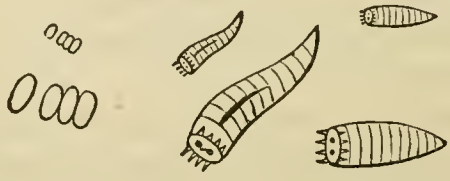

Fig. 6.—Eggs of onion maggot natural size and enlarged, at left; maggot natural size and enlarged, in centre; pupa natural size and enlarged, at right.

maggots they produce burrow into the stem, root or bulb of the plant, often causing a serious amount of damage. After feeding until full-grown the maggots leave the plant and become quiet pupæ for a time, after which the adult flies escape from them to lay eggs for another brood, of which there are two and perhaps more, each year, of the kinds here considered.

Treatment.

Many methods have been suggested for checking the ravages of these pests, but only a few are of any value. Protection from the cabbage root maggot may be obtained by the use of tar paper cut to encircle the stems of the plants when these are set out, but the cost of preparing and applying the pieces reduces the value of this method. Before the appearance of the maggots the use of carbolic acid emulsion has been strongly recommended. To prepare this a pound of hard soap or a quart of soft soap should be dissolved in a gallon of boiling water. Into this pour a pint of crude carbolic acid and stir until an emulsion is thoroughly formed. To treat the plants, one quart of this mixed with about thirty quarts of water will give the required strength. In applying this emulsion, begin the day after the plants have been set out, or, if raised from seed, a day or two before they come up, thoroughly moistening the ground close to each plant with it, and particularly the stems just below the level of the ground in the case of plants which have been set out. The object of this is to kill every egg and maggot present, by actual contact with the emulsion. This treatment should be repeated every week or ten days till about the first of June. "Whoever has tried this emulsion thoroughly, reports success" (Slingerland).

Another and apparently equally successful treatment is by the use of carbon disulphide. To apply this properly an apparatus such as the McGowan injector is necessary. In using this, push the tip of the injector into the ground three or four inches away from the plant and run it obliquely down to a point just below the roots; then force about a teaspoonful of the carbon disulphide out of the injector into the ground, remove the injector and close up the hole with earth pressed down by the foot. This treatment usually needs to be made but once, when the maggots first appear, but would probably be more effective with cabbage and cauliflower than with onions, turnips and radishes, where the carbolic acid emulsion treatment is preferable.

Looking for and crushing the eggs and maggots by hand is also highly recommended where labor is cheap.

Flea Beetles.

Flea beetles of several kinds are often present in destructive abundance on various plants early in spring. They feed on the tissues, making little holes, and when disturbed take sudden leaps which make it difficult to capture them. The young of these insects are stem and leaf miners, but rarely do sufficient damage to require treatment. For the beetles themselves, spraying the plants attacked, with Paris green, Arsenate of lead or any of the stomach poisons is usually entirely effective, though as various plant diseases often begin at the holes made by these insects it is generally better to use Bordeaux mixture with a little of the poison added, as Bordeaux mixture appears to be successful against flea beetles as well as being a fungicide.

Cut Worms.

Under the name "cut worms" are included the caterpillars of a large number of kinds of moths, which hide in the ground during the daytime and feed at night.

In cases where these pests are known to be abundant in sodland which is to be cultivated, it is advisable to plow quite early in the fall, and apply the potash which is to be used at this time, Kainit being strongly recommended by some writers as probably the best form of fertilizer to use for this purpose, as it is objectionable to the insects.

Cut worms can also be destroyed by the use of traps. To prepare these, spray a small piece of clover or any juicy plant with one of the stomach poisons (one pound of the poison to fifty gallons of water) and then mow it close and spread this poisoned food in little heaps here and there over the field which should be ready for planting. The cut worms finding nothing else to feed on will eat this poisoned food and a large proportion will be destroyed.

Later in the season if cut worms appear, after the crop is up, protection from their ravages may be secured by mixing one pound of Paris green with fifty pounds of bran. When these are thoroughly mixed add water and a little molasses till the whole is about like dough. A tablespoonful at the base of each plant is more attractive to the cut worm than the plant itself, and ten pounds should be sufficient to protect about an acre of potatoes or other crop planted in that way. Care, however, should be taken, that fowls and other animals likely to feed on this poisoned food be kept away from it while it is exposed.

This method should also be successful where cut worms are troublesome in greenhouses.

MASSACHUSETTS

CROP REPORT

FOR THE

MONTH OF JUNE, 1900.

ISSUED BY

J. W. STOCKWELL,

SECRETARY STATE BOARD OF AGRICULTURE.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1900.

Crop Report for the Month of June, 1900.

Office of State Board of Agriculture,
Boston, Mass., July 2, 1900.

Bulletin No. 2, Crop Report for the month of June, is herewith presented. We desire to call the attention of our readers to the article at the close of the bulletin, on "Possibilities for Farm Forestry in Massachusetts," by Allen Chamberlain, secretary of the Massachusetts Forestry Association. This is a subject which deserves more attention at the hands of the farmers of the State than they usually give to it, and we feel sure that a careful perusal of this article cannot but be beneficial to all our readers.

Progress of the Season.

The June returns of the United States Department of Agriculture (Crop Circular for June, 1900) indicate a reduction of 1,676,000 acres in the winter wheat acreage, in addition to that announced May 10, bringing the area of winter wheat under cultivation June 1 down to 24,908,000 acres, or a reduction from the area sown in the fall of 5,240,000 acres. The condition of winter wheat also declined during May 6.2 points, the condition June 1 being 82.7, against 88.9 on May 1, 67.3 last year, 90.8 at the corresponding date in 1898, and a ten-year average of 80.7. Preliminary reports on spring wheat acreage indicate a reduction of about 567,000 acres, or 2.9 per cent. The average condition of spring wheat June 1 was 87.3, as compared with 91.4 last year, 100.9 at the corresponding date in 1898, and a ten-year average of 93.

The total reported acreage in oats exceeds the acreage harvested last year by 3.9 per cent. The average condition of oats is 91.7, against 88.7 on June 1 last year, 98 at the corresponding date in 1898, and a ten-year average of 89.8.

The acreage reported as under barley is six-tenths of 1 per cent greater than the area harvested last year. The average condition of barley is 86.2, against 91.4 last year, 78.8 at the corresponding date in 1898, and a ten-year average of 88.5.

The acreage under rye shows a reduction of 4.1 per cent from that harvested last year. The average condition of rye is 87.6, as compared with 84.5 on June 1 last year, 97.1 at the corresponding date in 1898, and a ten-year average of 89.9.

The average condition of the apple crop is exceptionally favorable, the whole of the fourteen States having 3,000,000 or upward apple trees in bearing at the last census reporting a condition above, and most of them considerably above, their ten-year averages. Of the remaining States and Territories, all but some half dozen have the promise of more than an average crop.

The acreage of rice is somewhat less than that of last year. The condition of rice is 5 points above the ten-year average in Louisiana, the State of principal production, while in South Carolina and North Carolina, which are next in rank, it is 3 and 4 points, respectively, below the average.

The present prospects of the peach crop are nothing less than phenomenal, almost every important peach-growing State reporting a condition far above the average, and some even above 100. Among the latter are Delaware, Georgia and North Carolina, whose reports of 106, 110, 105 are about double their respective ten-year averages. California, with a condition of 77, or 6 points below the average, is the only noteworthy exception.

The total area estimated as planted to cotton is 25,558,000 acres, an increase of 2,036,000 acres, or 8.7 per cent over the productive area of last year. The average condition of the growing crop on June 1 was 82.5, as compared with 85.7 last year, 89 at the corresponding date in 1898, and 87.1 the mean of the June averages of the last ten years. This is the lowest June condition, with one exception, for twenty years. A largely increased use of fertilizers is reported from the older States, and unusual care is generally being exercised in cultivation.

The condition of clover in almost all the principal clover States falls considerably below the ten-year average.

In Massachusetts the acreage of rye as compared with last year is given as 95, and the average condition June 1 as 94; the acreage of oats as 101, and the condition as 90; the acreage of barley as 98, and the condition as 84; the acreage of clover as 101, and the condition as 93; the average condition of spring pasture as 92; the average condition of apples as 102; and the average condition of peaches as 72.

Temperature and Rainfall for the Whole Country.

[From United States Climate and Crop Bulletins.]

Week ending May 28. — In the middle and north Pacific coast regions and generally throughout the Gulf and Atlantic coast districts the week was cooler than the average. Over the central and southern Plateau regions, including southern California, and from the northern Rocky Mountain region eastward over the central valleys and the Lake region, the week averaged warmer than usual, the most marked excess occurring in the upper Missouri valley and the upper Lake region. More than the usual amount of rain fell on the north Pacific coast, over portions of central and western Texas, Florida, the northern portions of the east Gulf and South Atlantic States, the middle Atlantic coast, central Kansas and local areas in eastern Nebraska, northern Illinois, southern portions of Wisconsin and Michigan and central Indiana. Over much the greater portion of the country, however, the weekly precipitation was below the average.

Week ending June 4. — The week, as a whole, was warmer than usual, only comparatively limited areas showing temperatures below the normal. It was decidedly warm in the central Rocky Mountain region, Missouri valley, and in northern New England. In the Southern States and generally to the east of the Mississippi except in northern New England, the temperature differed but slightly from the normal although generally in excess. On the south Atlantic and central Gulf coasts, in portions of the Ohio valley and upper Lake region, over western Texas and on the central Pacific coast, average daily temperatures were slightly below the

normal. Exceptionally heavy rains fell during the week over the greater portion of the central and west Gulf States, in the lower Ohio valley, and in portions of the Lake region and the central Mississippi valley. From southern New England to the east Gulf coast the rainfall was below the average, and there was also decidedly less than the average weekly rainfall over much of the lower Missouri and upper Mississippi valleys.

Week ending June 11. — Nearly normal temperature conditions prevailed in the lower Ohio valley, east Gulf States, and along the immediate Atlantic coast. Throughout the greater part of the country the week averaged warmer than usual, the average daily temperature excess ranging from 3° to 6° over the interior of Middle and South Atlantic States, and portions of the Lake region, and amounting to over 3° over nearly the whole of the country to the west of the Mississippi River. Heavy rains fell in southern Georgia, northern Florida, over the northern portions of the east Gulf States, southern Louisiana, western Tennessee, north-eastern Arkansas, southern Missouri, southern Illinois, portions of northern Iowa and southern Wisconsin, central and northern Indiana and northern Ohio, heavy local rains occurring over limited areas in portions of the Middle and South Atlantic States. Elsewhere the rainfall was generally below the average, no appreciable amounts falling over southern New England, portions of the Middle Atlantic States, and nearly the whole of the Plateau and Pacific coast regions.

Week ending June 18. — The week averaged cooler than usual in the central valleys, Lake region, over the greater part of the Middle Atlantic and east Gulf States, the interior of California, and the western portions of the middle and southern Plateau regions. The week averaged warmer than usual over the north Pacific coast, northern Plateau region, eastern Rocky Mountain slope, west Gulf States, over portions of the South Atlantic States and on the New England coast. Very heavy rains fell during the week over most of the Middle and South Atlantic and east Gulf districts, including the central Mississippi and portions of the lower Ohio and Missouri valleys. In the Lake region, northern New England, upper Ohio and Red River of the North val-

leys, Texas, and generally throughout the eastern Rocky Mountain slope and Plateau regions, the week was drier than usual, a large part of the Lake region and Texas receiving no appreciable amount.

Week ending June 25. — The week was warmer than usual in the Rocky Mountain and Pacific coast regions, upper Missouri Valley and over the northern part of the upper Lake region. The week was slightly warmer than usual in southern Texas and over portions of New England. Generally throughout the Southern States, lower Missouri, central Mississippi, and Ohio valleys, including the southern portion of the upper Lake region and the Middle Atlantic States, the week was cooler than usual. Very heavy rains fell during the week in the central and east Gulf, and South Atlantic States, lower Missouri, central Mississippi, and lower Ohio valleys. There was less than the usual amount of rain in New England and the Middle Atlantic States, upper Ohio Valley, over the greater portion of the Lake region, upper Missouri and Mississippi valleys, and generally throughout the eastern Rocky Mountain slope and the Plateau region.

Special Telegraphic Reports.

[Weather Bureau, Boston.]

Week ending May 28. — New England. Boston: Weather continued cool, without extremes; little precipitation, all of which fell first part of week; wet ground at beginning of week delayed farm operations; planting in southern New England about half done; almost all potatoes seeded; fruit promising; no tobacco planted yet.

Week ending June 4. — New England. Boston: Week favorable for farm work and growth of crops; late rains have been general; planting about completed in southern districts; much corn to be planted in northern portion; fruit and vegetables excellent.

Week ending June 11. — New England. Boston: Favorable week, normal temperature, much sunshine, little rain; planting completed in northern and cultivation begun in southern portions; rye, heavy crop; fruit, excepting peaches and plums, promising; vegetables excellent; three-fourths of tobacco crop transplanted.

Week ending June 18. — New England. Boston: Weather very favorable; showers near close of week very beneficial, but rain still needed in many sections of southern portion; average hay crop assured; fruit and vegetables promising; tobacco satisfactory.

Week ending June 25. — New England. Boston: Fore part week dry, abundant sunshine, heavy rains in southern and eastern portions; Friday, rain much needed northern and western portions; hay crop short; corn and potatoes in good condition, hoed once in northern and twice in southern district; apples abundant; peaches plentiful in Connecticut.

The Weather for June, 1900.

The month opened with warm weather, the average temperature for the first two or three days ranging above the normal of the season. This was followed during the latter part of the first week by one or two cool days. Showers, timely and well distributed, afforded sufficient moisture. The second week of the month was continuously warm. The temperature, however, was not excessive, and the maximum did not exceed 90 degrees. In addition to the equitable distribution through the several days, there were no sharp contrasts in the thermal conditions of the days and nights. There was much sunshine during this period, with an average of four clear days. The rainfall was light, in the form of showers, which fell chiefly on the 8th and 9th. There was a continuation of fine weather through the third week, with cloudless skies on an average of three to four days. The rainfall was light, although it was well distributed over the State. There was no marked change in the temperature, which ranged near the average for the season; it was, however, slightly lower than for the preceding week. The closing week of the month was devoid of unusual features. The temperature did not vary greatly from the normal, and there were no remarkable extremes in the maxima and minima. The precipitation was deficient and irregularly distributed. Excepting in coast sections, where copious local showers were reported on the 23d, the rainfall was light. There were fewer thunder storms

than usual during the month, they were of the moderate type, and little damage resulted therefrom. Considered as a whole, the weather of the month was generally favorable.

In the circular to correspondents, returnable June 22, the following questions were asked: —

1. What insects are proving injurious in your locality?
2. How is Indian corn looking, and what is the acreage as compared with previous years?
3. Has haying begun, and what is the prospect for the crop?
4. How does the acreage of early potatoes compare with previous years, and what is the promise for the crop?
5. How do early market-garden crops compare in yield and price with previous years, and what is the prospect for those not yet harvested?
6. How do the quantity and price of dairy products and the supply and price of dairy cows compare with former years?
7. What is the condition of pasturage in your locality?
8. What is the outlook for such fruits and berries as are grown for market, naming them?

Returns have been received from 156 correspondents, and from them the following summary has been made up: —

Insects.

Potato bugs appear to be rather more prevalent than for the last few years, but are so easily controlled that no serious damage from them is to be expected. Other insects do not seem to be even usually prevalent, though this may be due in part to the cool nights and general lateness of the season. Canker worms, cut worms and squash bugs are the insects most complained of, 20 to 30 correspondents reporting their presence. Other insects mentioned are tent caterpillars, white grubs, spittle insects, currant worms, cabbage worms, wire worms, asparagus beetles, elm leaf beetles, grass thrips, horn flies, onion maggots, codlin moths, plant lice and cranberry fire worms.

Indian Corn.

The cool weather of the past month, together with the lateness of planting, has held corn back until it is now from one to two weeks behind the normal in development. It is reported to be otherwise in good condition, the stand and color generally being first class, and with warm weather and a normal amount of rainfall the crop should do well. There appears to be a quite general increase in acreage this season.

The Hay Crop.

Haying was not generally begun at the time of making returns, but at date of issue it should be well under way in all sections. The crop will generally be below the average and in some sections will be very light. The showers of the 22d probably did some good, but we fear came too late to materially affect the result in most sections. Of 152 correspondents replying to the question in regard to the hay crop, only 35 speak of it as "average," "good" or "above average." The quality of the crop generally promises to be good.

Early Potatoes.

The acreage of early potatoes appears to be about the same as usual, with perhaps a slight increase in eastern sections. The vines generally look well, though possibly a little backward, taken as a whole, and the prospect is that there will be a good crop.

Market-garden Crops.

Early market-garden crops are about average as to yield and price, with the exception of asparagus, though all are somewhat backward. Asparagus was much injured by frost and the crop was light in all sections, with prices good. Later crops look well at present and promise good yields.

Dairy Products.

The supply of dairy products is about normal, and there seems to be a slight but wide-spread increase in prices received for them. Judging from the returns, the reaction from the falling prices which were reported up to last year

has set in. Dairy cows continue scarce in proportion to the demand, and generally command higher prices even than ever before.

Pasturage.

Pasturage is on the whole in good condition at present, though there are numerous complaints that feed is short and pastures in need of rain. The showers of the 22d must have helped pastures in most sections, and with normal rainfall in the future they should do well.

Fruits and Berries.

Strawberries suffered from frost at time of bloom, and have recently suffered in many sections from the dry weather. The crop will as a whole be far from a good one; but, as prices rule high, it should generally be a profitable one to the grower. Raspberries and blackberries bloomed very full, and with rain should yield well. Currants have generally done well. Apples promise a good bearing-year crop, although there are a few complaints of injury from frost and a few that they are dropping badly. Peaches will be a light crop in most localities, but still fully up to the average for the State. Pears promise a fair crop. There will be some plums, but the crop is generally light. Cherries suffered from frost apparently more than was thought at the time, and are generally a very poor crop. Wild berries blossomed well.

NOTES OF CORRESPONDENTS.

(Returned to us June 22.)

BERKSHIRE COUNTY.

Sheffield (Dwight Andrews). — Potato bugs and squash bugs are doing some damage. Indian corn is late and backward, with about the usual acreage planted. Haying has not begun, and the prospect is for a light crop. Potatoes promise an average crop. Early market-garden crops are about average in yield and price. There is about the usual quantity of dairy products, and the price of dairy cows is high. Pastures are getting dry. There are no cherries; strawberries and raspberries fair crops.

Alford (L. T. Osborne). — Indian corn is in normal condition, though perhaps a little late; acreage average. Haying has not begun, and it has been so dry that the crop will not be up to the average. The acreage of early potatoes is average and the crop promising. Prices are a little better than usual for dairy products, with prices for cows about as usual. Pasturage is in fine condition.

Lee (Alonzo Bradley). — Potato bugs are the only insects doing damage. Corn is in first-class condition, with about the usual acreage. The hay crop will be rather light on old meadows, but otherwise will be good. Early potatoes have about the usual acreage and promise well. The price of dairy products is increased 5 per cent over former years. Pastures are in fine condition. Apples promise to be a very good crop.

Richmond (T. B. Salmon). — Potato bugs are doing some damage. Indian corn is small and backward, with about the usual acreage. Haying has not begun, and there will not be over a two-thirds crop. There is the usual acreage of early potatoes, and a good crop is promised. Early market-garden crops are about average in yield and price. Dairy products and dairy cows are about average as to quantity, supply and price. Pastures are in good condition. Strawberries, raspberries and blackberries will be good crops; cherries a light crop.

Peru (J. P. Sennett). — Indian corn is very small for the season, and the acreage is reduced. Haying has not commenced,

and the crop is very backward. The acreage of early potatoes is less than usual; crop looking well, but will be late. The price of dairy products is a trifle higher than last year; demand for new milch cows good, prices ranging from $35 to $50. Apples are the only fruit raised for market, and they are looking well and promise an abundant yield. Pasturage is in good condition.

Windsor (W. H. Tirrell). — Corn is looking well, with about the usual acreage. Haying has not yet begun, and there is a promise of an average crop. Early potatoes promise to be a good crop, with about the usual acreage. Early market-garden crops compare well in yield and price with former years, and the prospect for those not yet harvested is good. Dairy products are about average in quantity and price. Pastures are in good condition. The outlook for fruits and berries grown for market is good.

Savoy (W. W. Burnett). — Potato bugs are doing some damage. Corn is looking fairly well, acreage a little increased. Haying has not begun as yet, and the prospect is for a light crop. Early potatoes show about the usual acreage, and promise an average crop. Garden crops are backward. Dairy products are fully up to the average in quantity and price. Pastures are in more than average condition. The promise for wild berries is good; very little done with fruits and berries. Rain is needed for all crops.

Florida (E. D. Rice). — White grubs are doing some damage in mowings. Corn looks well, with a 20 per cent increase in acreage. Haying has not yet begun; the crop would be fair if we could have a good rain. The acreage of potatoes is about the usual average, and the crop is now looking well. The demand for butter seems good, with prices from 18 to 25 cents per pound. Pasturage is in very good condition. Strawberries winter-killed quite badly; other fruits and berries looking well.

Williamstown (S. A. Hickox). — Indian corn is looking well, with the usual acreage. Haying has begun, with a prospect of a three-fourths crop, the severe droughts of the two last years having greatly injured grass roots. Early market-garden crops compare well in yield and price with former years, and the prospect is good for those not yet harvested. Dairy products bring better prices than last year, and dairy cows rule higher, bringing from $35 to $50. Pasturage is in good condition. Strawberries, raspberries and blackberries all promise well, and apples have made a fine set.

FRANKLIN COUNTY.

Monroe (D. H. Sherman). — Potato bugs are doing some damage. But very little Indian corn is planted, and what there is is backward. Haying will not begin until into July; newly seeded

fields will give a fair crop, old mowings light crop. The quantity and price of dairy products and the supply and price of dairy cows are about average. Pastures are in fair condition. Apples are the only fruit raised, and they blossomed very full. Wild berries never blossomed fuller.

Bernardston (R. H. Cushman). — Colorado potato beetles are very numerous. Corn is backward, but looking well, with a large acreage. Haying has begun, and the crop will be light. Potatoes are doing well. Prices for dairy products are somewhat better than last season, and dairy cows sell well. Pastures are in good condition. Apples will be a light crop, but berries promise large crops.

Shelburne (G. E. Taylor). — Potato bugs are beginning to appear. Indian corn is a little backward, with a fair stand; acreage slightly increased. Haying has not yet begun, and the crop will be below the average. The acreage of early potatoes is about the same as usual, and they promise well. Dairy products bring higher prices than in former years, and the price of cows is high. Pasturage is in good condition. Currants, strawberries and blackberries promise abundant crops. Grass in meadows and pastures is greatly in need of rain.

Conway (J. C. Newhall). — Squash and cucumber bugs are the only insects doing damage. Corn is looking fairly well, but is late; the acreage is increased this year, many farmers trying to raise what they feed and more growing it for the silo. Haying has not yet begun, and the prospect is for a very light crop. Early potatoes show about the usual acreage; the crop promises well, but is generally late. The quantity and price of dairy products are about average; dairy cows in good supply, and not quite as high as last year. Owing to the cold and drought, spring pasturage is rather short. The late frost damaged all fruits and berries.

Whately (Frank Dickinson). — Cut worms are doing some damage. Indian corn is rather backward, but is coming on well now; acreage about average. Haying has begun, and the crop will be very light on old ground. The acreage of early potatoes is rather less than usual, but they are looking finely. Early market-garden crops are light, with prices average; later ones need rain. Quantity of dairy products not large, but quality of the best; dairy cows plenty and prices below the the average. Pastures are dry, but are lightly stocked. The outlook for fruits and berries is good.

Sunderland (J. M. J. Legate). — Cabbage and onion maggots are plenty, while cut worms are doing damage to tobacco and wire worms to corn. Corn is backward; acreage the same as

usual, with perhaps a little more ensilage corn planted. Haying has not yet begun, and with rain the crop will be above the average. About the usual acreage of potatoes has been put in; very few raised for market. Quantity and price of dairy products about average; cows scarce and high. Pasturage is looking well. Apples will be a full crop; few pears and no peaches; plums half a crop; strawberries are late, and need rain.

Leverett (W. L. Boutwell). — Cut worms are doing some damage. Indian corn is backward, with about the usual acreage. Haying has not begun, and the prospect is for a very short crop. There is about an average acreage of early potatoes, and the crop promises well. Early market-garden crops are about average in both yield and price. Prices and quantity of dairy products about average; demand for dairy cows fair and prices good. Pasturage is in good condition.

Wendell (N. D. Plumb). — Potato bugs and tent caterpillars are doing some damage. Corn is rather backward, and there was not as much planted as in previous years. Haying has not begun, and the crop is very backward. About the usual acreage of early potatoes was planted, and the crop is very promising. Dairy products are high, and dairy cows are scarce and bring big prices. Pastures are in the best condition for years. The outlook for fruits and berries is very promising.

HAMPSHIRE COUNTY.

Greenwich (Wm. S. Douglas). — Potato bugs are doing some damage. Indian corn is looking fairly well for such a cold season. Haying has not yet begun, and the prospect is for a light crop. The acreage of early potatoes is about average and the crop promises well. Not many early market-garden crops are ready for market. Dairy products bring higher prices than of late years. Pasturage is not in the best condition. Currants are looking well; strawberries small and a light crop.

Pelham (J. L. Brewer). — Potato bugs and squash bugs are doing some damage. Indian corn is quite small as yet; acreage about the same as in former years. Haying has not yet begun; grass wintered well, and the prospect is for a better crop than last year. Early potatoes look finely, but need rain. Dairy products are average as regards quantity and price. Pastures are in fair condition. Native strawberries promise a large crop. The season is late and crops proportionately backward.

Hadley (L. W. West). — Potato bugs are doing some damage. Corn is backward, but the acreage is larger than in recent years. Haying has not yet begun, and the prospect for the crop is not as

good as a month ago. There is about the usual acreage of early potatoes, and the promise of a good crop. The yield and price of early market-garden crops are about as in former years, with apparently good prospects for later ones. Quantity of dairy products about the same as usual, but price a little better; dairy cows are cheaper than last year and the supply a little larger. Strawberries were injured somewhat by frost; blackberries and raspberries blossomed well; few pears; no plums; peaches more than an average crop; apples look well, though not apparently a large crop.

Granby (G. H. Blish). — Indian corn is very small and backward, on account of cold weather; there is about the usual acreage. Haying has hardly begun, and the crop is not as large as was expected earlier in the season. There are very few early potatoes raised. There is little done in market-gardening, and crops are generally backward. Quantity and price of dairy products about the same as usual, while cows are scarce and higher. Pasturage is in fair condition. No fruit is grown except apples, and there is not a large crop in prospect.

Easthampton (Wm. C. Clapp). — Potato bugs, squash bugs, rose bugs and tent caterpillars are doing some damage. Early fields of corn are growing fast, and the acreage is fully up to the average. Haying has not commenced to any extent, and the crop is suffering for want of rain. Fully as many early potatoes were planted as usual, but frosts and the late, cold spring make them backward. Frosts injured early market-garden crops; supply short and prices fully up to the average; late crops in fair condition, but need rain. The quantity and price of dairy products and the supply and price of dairy cows do not vary very much. Strawberries are a short crop, prices high; other berries bloomed well, but will not amount to much unless we have rain and plenty of it; fruits promise to do well.

Williamsburg (F. C. Richards). — Potato bugs are in evidence, as usual. Indian corn is backward, but looking well, and with rain and warm weather will do well. Haying has hardly begun, and the crop will be light except on good, rich mowings. Not many early potatoes are raised here. Quantity and price of dairy products and supply and price of dairy cows about the same as usual. Pasturage is in good condition, but will need rain soon. Peaches, pears and cherries will be light crops; apples will probably be a medium even-year crop, as the condition has fallen off fully 25 per cent since the bloom, which blighted badly.

Cummington (S. W. Clark). — Indian corn is small, and did not come up very evenly, but is now growing fairly. Haying has

not yet begun, and the crop will probably be rather light. There is the usual acreage of early potatoes, and the crop looks well. March prices for butter were 4 cents per pound, and April prices 2 cents per pound, higher than in 1899; dairy cows higher than last year. Pasturage is in better condition than at any time last year. We hope for a good apple crop; no berries grown for market.

HAMPDEN COUNTY.

Blandford (E. W. Boise). — Tent caterpillars and potato beetles are doing some damage. Indian corn is small, with the acreage increased 10 per cent. Haying has not yet begun, and the prospect for the crop is poor. The acreage of early potatoes is about the same as usual. Early market-garden crops are late, and the prices are about average. Dairy products are fully up to the average in quantity and price; dairy cows from 10 to 15 per cent higher in price than formerly. Pasturage is short, and the prospect is that all stock will be low in the fall. The outlook for fruits and berries is good. Farm work is behind, on account of the scarcity of farm help. All farm products are bringing good, fair prices.

Russell (E. D. Parks). — Indian corn is looking fairly well, with about the usual acreage. Haying has begun, and the prospect is for a light crop. The acreage of early potatoes is about the same as usual, and the crop is looking quite nicely. But little done here in market-garden crops. Dairy products are up to the average in quantity and price. Pastures need rain badly. Strawberries are a rather small crop; other fruits good. Rain is needed here to help the growing crops and the grass in pastures.

West Springfield (T. A. Rogers). — Horn flies, squash bugs and potato bugs are doing some damage. Indian corn is about ten days late, with about the usual acreage. Haying is just beginning; some fields good, others half a crop. There is a full acreage of early potatoes, and they are looking very well, though late. Early market-garden crops made about an average yield; prices about average; prospect good for later ones. Dairy products are a full supply as to quantity, and prices are little changed; dairy cows a little higher in price. Pastures are rather short for June. Strawberries are doing fairly well; blackberries and raspberries promise well.

Chicopee (R. W. Bemis). — No insects have done any damage to speak of. Corn is looking fairly well where the ground was properly prepared and fertilized. Haying has not yet begun, the crop not being quite as early as usual, and rather light. The acreage of early potatoes is normal, and good crops are promised. Early market-garden crops compare well with former years in yield and

price, and later ones promise well. Dairy products increased in quantity, price about the same as usual; price of good cows well up with former years. Pastures are in fair condition, though a little dry. Strawberries and cherries are not plenty.

Wilbraham (F. E. Clark). — Insects are not as numerous as usual. Indian corn is from two to three weeks late, but is looking fairly well. Haying has begun; newly seeded and well-fertilized fields are looking well, but old and uncared-for mowings will not produce half a crop. The acreage of early potatoes is about average, and they promise a full crop. All early market-garden crops are late, but promise fair yields and prices. Quantity and price of dairy products normal; poor and ordinary cows plenty; A No. 1 cows scarce and high. Pasturage is looking well and stock are thriving. Apples and peaches will be perhaps half crops; cherries few; strawberries plenty; raspberries above average yield.

Monson (A. H. White). — Potato bugs are quite plenty and horn flies are troubling cows. Corn is pretty small, but the acreage is rather increased. Haying has not yet begun, but the crop looks well on all but poor land. The acreage of early potatoes is rather less than usual, but the crop looks well. Butter is quite low just now, and the demand for dairy cows seems lighter than usual. Pastures are in poor shape. Native strawberries are just coming into the market; apples, plums and peaches have dropped a good deal.

Wales (C. F. Crawford). — Potato bugs are more plenty than common. Indian corn is doing fairly well, with about the usual acreage. Grass is a light crop, and none has been cut as yet. Potatoes are looking well, and about the usual amount have been planted. Early market-garden crops were somewhat injured by frost. Supply of dairy products good and prices good; dairy cows a little more plenty than usual, and cheap. Pastures and all grass lands are in poor condition. Apples were injured by the frost, and will be a medium crop; pears about average; wild grapes, berries and nuts blossomed full.

Brimfield (C. S. Tarbell). — Owing to cold weather, corn does not look as well as it should at this time of year; acreage about as usual. The prospect is that the hay crop will not be up to the average. The acreage of early potatoes is larger than usual, and they are looking well. The quantity and price of dairy products and the supply and price of dairy cows are about as last year. There is much complaint of shortness of feed in pastures. The outlook for the apple crop is good.

WORCESTER COUNTY.

Dudley (J. J. Gilles). — Insects of all kinds are doing more or less damage. The acreage and stand of Indian corn are both average, but the crop is from a week to ten days late. Haying will begin next week, and the crop will hardly be up to the average. The acreage of early potatoes is normal; they are growing well, but lack stockiness. Peas are extra in yield and price; other early vegetables lower. The quantity and price of dairy products and the supply and price of dairy cows are about normal. Pasturage is in good condition. Crop of strawberries one-fourth short, but prices thus far are enough higher to nearly make up for the loss in yield; other fruits give promise of a good yield.

Brookfield (F. E. Prouty). — Corn is looking well, and the acreage is fully as large as usual. Haying has not yet begun, and the prospect is for a light crop. The acreage of early potatoes is fully as large as last year, and the promise for the crop is good. The price and yield of early market-garden crops is about the same as usual, and those not yet harvested look well. Quantity of dairy products about average, price a little higher for butter and milk; dairy cows are not selling quite as high as a year ago. Pasturage is in good condition. There are but few berries grown in this vicinity for market, but those grown are looking well.

New Braintree (C. D. Sage). — Indian corn has about the usual acreage, and is looking well. Haying has not yet begun, and the prospect is not very encouraging. The acreage of early potatoes is about the same as usual, and the crop is looking well. Dairy products are hardly up to the average in quantity, but sell a little higher. Pasturage is rather poor for the time of year. The season is late, and hay and grass are not as promising as usual; still, there is time for the hay crop to grow, if we have rain.

Dana (E. A. Albee). — Potato bugs are numerous. Indian corn is looking well, but is late and small; acreage about three-fourths that usually planted. The hay crop will be very light, and two weeks late. Early potatoes were frozen and are later than usual, but are looking very well at present. No early market-garden crops have been harvested as yet. The quantity and price of dairy products and the supply and price of dairy cows are about average. Pasturage is short, on account of dry weather. Strawberries are a short crop; currants average; blackberries blossomed full; raspberries look well.

Royalston (C. A. Stimson). — Potato bugs and codlin moths are doing some damage. Corn is looking well; acreage about the

same as last year. Haying has not begun, and the crop will not be up to the average. About the usual acreage of early potatoes has been put in, and the crop looks well. Quantity of dairy products up to the average, prices high; good cows scarce and high. Pasturage is in fair condition. Apples, pears, plums, cherries, strawberries, blackberries and raspberries had a full bloom, and the outlook for all of them is fine. The season is eight days late.

Gardner (A. F. Johnson). — Potato bugs are doing some damage. Indian corn is later than usual, with an average acreage. Haying has not yet begun, and the prospect for the crop is poor. The acreage of early potatoes is average, but the crop is backward. Early market-garden crops do not vary much from former years in yield and price. There is no change in the quantity and price of dairy products or the supply and price of dairy cows. Pasturage is in poor condition. It is too early to predict as to fruits and berries.

Westminster (G. A. Stockwell). — Potato bugs are doing some damage. Indian corn is looking well, with the acreage a little above the average. Haying has not begun, and the prospect is for a good crop. More early potatoes have been planted than last year, and the prospect is for a large crop. Early market-garden crops are about normal in yield and price. Pastures are in good condition. There will be a large crop of all kinds of berries and small fruits this year.

Princeton (A. O. Tyler). — Potato bugs and cut worms are doing a great deal of damage. Corn is backward, with about the usual acreage. Haying has not yet begun, and the crop will be light if dry weather continues. There are very few early potatoes raised here, but what there are look well. The quantity and price of dairy products and the supply and price of dairy cows are about the same as last year. Pasturage has been good, but needs rain at the present time. Cherries and pears are a failure, from late frosts; peaches not very good, for the same reason; apples and plums promise to be good crops; small fruits and berries promise well.

Harvard (J. S. Preston). — Canker worms have done considerable damage. Corn has about the usual acreage, but the cold nights have retarded its growth. Haying is later than usual, and the prospect is for less than an average crop. The acreage of early potatoes is about the same as usual, but the late frosts cut them down on low land. The quantity of dairy products increases every year, and the price has been low for years; the supply of cows is about average, and the price seems high in comparison

with the price of their products. We have had but little rain, and pastures are rather short. Strawberries, raspberries, currants, blackberries, plums, peaches and apples are all looking well.

Holden (G. S. Graham). — Potato bugs and white grubs are doing some damage. Indian corn is rather backward, with the acreage somewhat increased. No haying has been done as yet, and the prospect for the crop is very poor. There is about an average acreage of early potatoes, but it is too early to say what the prospect for the crop is. Quantity of dairy products about average and prices a little better; dairy cows not plenty and prices high. Pasturage needs rain, and is not in very good condition. All fruit blossomed well except grapes, which were winter-killed.

Worcester (S. A. Burgess). — Potato bugs, squash bugs and grass thrips are doing some damage. Indian corn is backward, with about the usual acreage. Haying has begun, and the crop is a light one. There is about the usual acreage of early potatoes. Early market-garden crops are about average as to yield and price. There is the usual quantity of dairy products and supply of dairy cows, and prices remain about the same. Pastures are dry. Apples and pears look well; few peaches; no cherries; blackberries and blueberries blossomed well; strawberries are late, but with plenty of rain may do well.

Southborough (E. F. Collins). — Potato bugs and elm leaf beetles are doing some damage. Indian corn looks well, but is a little late; acreage a half more than the average. Haying has not yet begun; the crop will be good on newly seeded fields, but light on old ones. The acreage of early potatoes is about the same as usual, and promises about an average crop. The quantity of dairy products is about average; milk 2 cents per can higher in price. Pastures are in fair condition, but have not yet recovered from the drought of last year. Apples promise an excellent crop and peaches a fair one.

Millbury (Herbert McCracken). — Canker worms are doing some damage. Corn is looking well, though backward, owing to cool weather, and there is a slight increase in acreage. Haying has not yet begun; prospect for the crop good on newly seeded ground and light on old ground. The acreage of early potatoes is larger than usual, and the prospect for the crop good. Early market-garden crops compare favorably in yield and price with former years, and the prospect is good for later ones. The quantity of dairy products is less than usual and the price higher; supply of cows short, price $5 a head more than formerly. Pasturage is in good condition. The promise for apples is good; peaches,

pears, plums and cherries poor; strawberries average crop; blueberries and blackberries in abundance.

Douglas (J. M. Rawson). — Colorado beetles, white grubs and rose bugs are doing some damage. Indian corn is looking well, with an increased acreage. Haying has not yet begun; the crop looks well, but will not cut what it looks. The acreage of early potatoes is increased, and the crop looks well at this time. Early market-garden crops are backward, and none have matured as yet. The quantity and price of dairy products are fair, and the prices for cows tend to increase. Pastures are not in good condition, and there is much feeding at the barns. Strawberries are a fair crop; blackberries look finely.

Blackstone (O. F. Fuller). — Potato bugs and squash bugs are doing some damage. Corn is a little backward, but the acreage is about the same as usual. Very little hay has been cut as yet. The acreage of potatoes is considerably increased. Market-garden crops are all backward, and prices are about as usual. More dairy products are produced than a year ago, and the retail price of milk has advanced. Pastures are as a rule in poor condition. There will be a short crop of plums, on account of the late frosts; some peach orchards will give a full crop, others none at all; pears few; apples promise a good crop; strawberries very scarce.

MIDDLESEX COUNTY.

Hopkinton (W. V. Thompson). — Potato bugs and spittle insects are doing some damage. Indian corn is in good condition, with the acreage about the same as usual. Haying has not begun, and the crop will be only fair. The acreage of early potatoes is about average, and the crop looks well. Early market-garden crops are not much raised. Milk is the only dairy product sold, and it is about as usual as regards both quantity and price. Pasturage is in fair condition. Strawberries, raspberries and blackberries are looking well.

Framingham (H. S. Whittemore). — Potato bugs and squash bugs are doing some damage. There is a full acreage of Indian corn, and it is looking finely, though rather late. But little haying has been done as yet, but the prospect is for a fair crop. The acreage of early potatoes is fully up to last season. Very few market-garden crops have been harvested as yet, but all look well. Prices for dairy products and dairy cows are fully as high as last season. Pasturage is in good condition, but rain is needed. Strawberries are a fair crop; blackberries promise well; cherries a light crop, owing to late frosts.

Sudbury (E. W. Goodnow). — Canker worms are doing some damage. Corn is very backward, and the acreage is about normal. Haying has not yet begun, but there is prospect of a good crop. Potatoes look well, and the acreage is about the same as usual. Early market-garden crops are about normal in yield and price, and the prospect is good for later ones. Dairy products are in better demand than usual, and prices are higher. Pastures are looking well. There promises to be a large crop of fruit and berries.

Concord (Wm. H. Hunt). — Indian corn is rather backward, on account of cold weather. Very little haying has been done as yet, and there will not be a full crop. The acreage of early potatoes is about the same as usual, and the promise for the crop is good. Asparagus has been a very light crop, having been frozen several times in May. Prices for dairy products are rather better than in previous years. Pasturage is in poor condition. Strawberries will be a fair crop, although injured by frost; blackberries promise well; no cherries; few peaches; pears rather light; early apples injured by frosts, late varieties hardly a full crop.

Littleton (G. W. Sanderson). — Tent caterpillars and canker worms have done damage where spraying has not been practised. The average amount of corn was planted, but is backward, on account of cool weather. Haying has not yet begun; old fields will give light crops; newly seeded land looks well. The average acreage of early potatoes has been planted, and they are looking well. Milk is the principal dairy product, with the quantity and price both greater than last year; good cows are in quick demand, at higher prices. Pastures are in good condition. Strawberries and blackberries are the principal small fruits grown, and promise well.

Ashby (A. Wetherbee). — Potato bugs are doing some damage. Corn looks finely and the acreage is increased about 10 per cent including that for the silo. Haying has not begun, and unless rain comes very soon the crop will be light. The acreage of early potatoes is rather above the average, and the crop promises fairly well. Quantity and price of dairy products average; dairy cows a little cheaper than last year. The weather has been too dry for grass in pastures to grow very fast. Strawberries are a short crop; apples dropping a good deal; too early to predict as to other fruits.

Pepperell (P. J. Kemp). — Rose bugs are doing some damage, and potato bugs are just appearing. Indian corn is about two weeks late, but looks healthy; acreage about the same as last year. Haying has not begun, and there is likely to be a very

short crop. The acreage of potatoes is rather increased; rather late, but looking well. Price and quantity of dairy products and supply and price of dairy cows about the same as in former years. Pasturage is very short and dry. Fruits and berries will not make over half crops, generally speaking.

Chelmsford (P. P. Perham). — Canker worms are doing some damage. Corn is late, with about the usual acreage. Haying has commenced, with the prospect of a light crop. Early potatoes promise well, with rain; acreage somewhat increased. Early market-garden crops compare favorably with former years in yield and price. Prices of dairy products somewhat higher than usual, and those of cows lower. Pastures never looked better. The outlook for all small fruits is good, especially strawberries and blackberries.

Carlisle (E. J. Carr). — Canker worms and squash bugs are doing some damage. Indian corn is looking well, with about the usual acreage. Haying has not begun, and the crop will be light, having suffered severely from drought. The acreage of early potatoes is increased, and they are in good condition. Asparagus is below the average in quantity and above in price; peas not up to the average. Full supply of dairy products and price of milk 2 cents per can higher; dairy cows scarce and high. Pasturage is in poor condition, having suffered from drought. Strawberries and blackberries are looking well.

Woburn (W. H. Bartlett). — Sweet corn is looking rather poorly. Haying is just commencing, and the crop will be good. There is about the usual acreage of early potatoes, and they now look well, though many fields suffered from frost. Early market-garden crops are about as usual in yield and price except asparagus, which is about half a crop. Pasturage is in fair average condition. Currants were injured by frost, and are not over half a crop; blackberries and raspberries bloomed full; strawberries a fair crop; few plums; no peaches; no cherries; apples set poorly, and are beginning to drop. Beans are coming on well, having suffered less from frosts than corn and asparagus.

Stoneham (J. E. Wiley). — Canker worms are doing some damage. Corn is looking fairly well, though backward, because of cold weather. Haying has not yet begun, and there will be over a two-thirds crop. The acreage of early potatoes is about average, but the crop is backward. Early market-garden crops are about average in yield and price. Pasturage is in fair condition. Currants are looking well.

Newton (Otis Pettee). — White grubs are doing much damage to growing crops and in grass fields in some localities. Corn

promises a full harvest, and is looking very well; acreage about the same as in former years. Haying is commencing a little; grass generally heavy and of good quality. Milk is more plenty than last year, probably owing to better pasturage; prices about as usual. Pastures are in very good condition. Strawberries are a good crop and yield well.

ESSEX COUNTY.

Salisbury (Wesley Pettengill). — Canker worms have done some damage, but have not been very bad generally. Indian corn is looking fairly well, with a slightly increased acreage. Haying has not begun, and the prospect is for a very light crop. The acreage of early potatoes is about average, and unless we have rain the crop will be a small one. Milk is about the same as in former years in price and quantity; prices of butter a little higher; cows bring good prices. Pasturage has been good, but now pastures on high ground begin to feel the dry weather. Strawberries started for a good crop, but now need rain badly; blackberries, raspberries and blueberries look well; apples promise a large crop.

Haverhill (Eben Webster). — Canker worms, squash bugs and potato bugs are doing some damage. Indian corn looks fairly well, but is late; acreage about the same as usual. Haying has not begun, and the crop will be less than average. The acreage of early potatoes is greater than usual, and the prospect for the crop good. Dairy products and cows are a little higher in price than usual. Pasturage is a little short, from want of rain. Cherries are a short crop; currants good; prospect for blackberries good.

Andover (M. H. Gould). — Cut worms are doing some damage. Corn is backward, but the acreage is up to the average. Haying has not yet begun, and the prospect is for a light crop. The acreage of early potatoes is about as usual, but the prospect for a crop is not good, as the frost cut off some and some rotted in the ground. Very few early market-garden crops have been harvested as yet. There is no surplus milk, and prices are higher than in former years; supply of dairy cows not above the demand, and prices high. Pastures are short and dry. Strawberries were hurt by frost; late apples looking well, early apples hurt by frost; peaches and pears injured by frost.

Ipswich (O. C. Smith). — Canker worms, squash bugs, rose bugs and potato beetles are doing some damage. Corn looks well, and the acreage is increased about 10 per cent. Haying has commenced in earnest; the crop needs rain, and will be 20 per cent

off. The acreage of early potatoes is somewhat increased, and the crop is later than usual, having been put back by frost. Not much difference in the yield of early market-garden crops, prices generally better; later crops promise well. Quantity of dairy products smaller than usual, prices better; cows bringing better prices than usual. Pastures are now in good condition, but will be short soon, if rain does not come. Pears, apples, strawberries, cranberries and wild berries promise large crops.

Wenham (N. P. Perkins). — Squash bugs, onion maggots and carrot lice are doing some damage. Not much corn planted, except for fodder; rather backward, but of good color. Haying has commenced on high lands; well-manured fields give a good crop, others light. There is about the usual acreage of early potatoes, but the prospect does not appear good. Spinach and lettuce bring very low prices. Good cows are as high as usual, and hard to get; milk is in fair supply, with prices unchanged. Rain is much needed for pastures, and many farmers are feeding at the barns. Strawberries will be a light crop, unless rain comes soon; fall and winter apples have dropped badly.

Manchester (John Baker). — Potato bugs, squash bugs, currant worms, canker worms and plant lice are doing some damage. Indian corn looks well, with about the usual acreage. Haying has begun on high land; crop will be light on high land, but good on low with a little rain. The acreage of early potatoes is about the same as usual, and the crop promises well. Early market-garden crops bring good prices, and the prospect is good for later ones. The quantity and price of dairy products are about the same as in former years. Pastures are rather dry. Strawberries fair crop; peaches, plums, apples and pears promise unusually well.

NORFOLK COUNTY.

Avon (S. F. Oliver). — Canker worms are doing some damage. Corn is looking fairly well, but with a tendency to be a little backward. Haying has not begun to any extent, but at present the crop looks to be a good one. More early potatoes than usual were planted, and they are looking well. There is a good demand for milk, but cows do not bring the prices they should. Pasturage is in good condition. Apples and pears give promise of a good crop.

Randolph (R. A. Thayer). — Canker worms and potato bugs are doing some damage. Indian corn is mostly raised as a fodder crop, and is looking finely, though backward. Haying has begun, with the prospect of a short crop. There is about the usual acreage of early potatoes, which are looking finely on moist land. The yield of early market-garden crops will be below the average,

owing to lack of rain, but prices are very fair. Quantity and prices of dairy products about as usual; good dairy cows scarce and high. Pastures need rain. Raspberries, gooseberries, currants, etc., promise a full crop.

Norfolk (G. E. Holbrook). — Canker worms are doing damage in some localities and potato bugs in all. Acreage of corn about as usual; crop very backward and in need of rain. Hay will be a light crop, and should be cut early. The frost cut all early potatoes; acreage increased about one-third. The prospect is fair for such market-garden crops as are grown here. There has been a small surplus of milk; milch cows scarce and high. Pasturage is in good condition, but needs rain. Strawberries are doing well; no peaches; apples look well, but will not be a heavy crop.

Millis (E. F. Richardson). — Cut worms and potato bugs are doing some damage. Indian corn is looking finely, though not quite as forward as usual; acreage above the average. Haying has not begun, and the crop will be small. The acreage of early potatoes is about the same as usual, and a good crop is promised. Early market-garden crops give fair yields and bring fair prices. Milk is higher, but cows remain about the same as usual. Pastures are short.

Medway (Monroe Morse). — Not much corn is planted, except for fodder; about the usual quantity for that purpose, and it is rather backward. Haying has not yet begun, and the crop will be slightly below the average. There will be a slight increase in the acreage of early potatoes, and they are now looking well. Pasturage is in fair condition. Cherries were largely killed by frost, also early plums and many early strawberries; apples, pears, peaches and grapes promise well.

Bellingham (J. J. O'Sullivan). — Potato bugs are doing some damage. Indian corn is looking poorly, with about the usual acreage. Haying has not begun, and the prospect for the crop is good. The acreage of early potatoes is above the average, and they are looking well. Dairy products and dairy cows bring fair prices. Pastures are in good condition. Strawberries will be less than an average crop.

BRISTOL COUNTY.

Mansfield (Wm. C. Winter). — Rose bugs and potato bugs are doing some damage. Indian corn is little grown, and that little is very backward. Haying has begun in a small way, and a fair crop is anticipated. Acreage of early potatoes about average, and the crop looks well, though late. Early market-garden crops are looking well, but there are none ready for market as yet. Prices of

dairy products about as usual, and of good dairy cows somewhat higher. Pasturage looks well at present, but needs rain. Apples look fairly well; pears and strawberries light crops.

Norton (Wm. A. Lane). — Potato bugs are doing some damage. Indian corn is backward, but the acreage is increased about a third over last year. Haying has not begun yet, and the crop will be a third heavier than last year. Potatoes are backward at present; acreage increased over last year. Early market-garden crops are not looking very well. Butter brings a little better prices than last year. Pasturage is in very good condition. Berries are looking well, but prices are low.

Raynham (N. W. Shaw). — Potato bugs, currant worms, rose bugs and canker worms are doing some damage. Indian corn is looking well, but is not much grown. Haying has not begun, but a good crop is in prospect. About the usual acreage of early potatoes has been put in, but the crop is later than usual. The early market-garden crops are about average as to yield and price. Dairy products bring higher prices than in the last few years. Pasturage is in good condition. Strawberries are a small crop, but bring good prices.

Dartmouth (L. T. Davis). — Potato bugs and striped squash bugs are doing some damage. Corn looks fairly well, though rather small; acreage about the same as usual. Very little haying has been done, and there will not be over a two-thirds crop. There is about the usual acreage of early potatoes, and the crop is looking very well. Market-garden crops are very backward, but are looking fairly well, considering the cold weather we have had. The quantity and price of dairy products remains about as last year, but the price of dairy cows is higher. Pastures are rather poor, on account of cold weather and lack of rain. It has been too dry for strawberries; currants, blackberries and plums are good; apples set quite well.

Acushnet (M. S. Douglas). — Potato bugs are more plenty than for several years. Indian corn looks poorly; it did not come up well, and the nights have been too cold for good growth; acreage about as usual. Haying has begun, and the crop is rather light, on account of dry weather. More early potatoes have been planted this year than usual, but the crop does not promise well. Early market-garden crops have been light, but prices good; prospect for later ones rather poor, on account of lack of rain. More milk produced than usual, price same as last year; price of dairy cows has risen. Strawberries are being marketed now, and the crop will be small; raspberries and currants are looking fairly well, but everything shows the need of rain.

PLYMOUTH COUNTY.

Hingham (Aaron Low). — Potato bugs are doing some damage. Indian corn is looking poorly, on account of dry weather. Haying has begun, and the crop will be heavy on moist land. Early potatoes show about the usual acreage; many fields were injured by late frosts. Most market-garden crops are backward and are looking poorly. Pasturage is not in good condition, owing to dry weather. Apples and plums promise well; peaches mostly killed by frost; strawberries a very small crop.

Marshfield (J. H. Bourne). — Canker worms, tent caterpillars, potato bugs, elm leaf beetles, cut worms and horn flies are all troublesome. Corn looks exceedingly well, and the acreage is a little larger than usual. Haying has begun; grass rather thin, but better than last year. Early potatoes are a week late, but are improving; acreage less than usual. Early market-garden crops are very backward, but peas are now coming on. The supply of milk is good and the price the same as usual; supply and price of dairy cows about as usual. Strawberries were injured by late frosts, but not as badly as appeared at first; cranberries injured somewhat.

West Bridgewater (C. P. Howard). — Canker worms are doing some damage. The acreage of corn planted for the grain is small, much more being fed green or ensiled. There is promise of a better crop of hay than last year. There were more potatoes planted than ever before, but the earliest were cut by frost. There has been a good demand for early market-garden crops, and prices have been satisfactory. There has been no change in the prices of dairy products. Pastures are in very good condition. All kinds of fruits blossomed full; strawberries will yield heavily with rain.

Kingston (G. H. Churchill). — Tent caterpillars are doing some damage. Indian corn is very backward for the time of year. Haying has not begun, and the prospect is for a very fair crop. Early potatoes promise well. Prices for early market-garden crops are good, but the crops themselves are backward. If anything, dairy products bring higher prices than in former years. Pasturage is in very good condition. Strawberries, blackberries and pears are not good crops; peaches there are none of any account; apples promise a fair crop.

Wareham (A. B. Savary). — Cabbage worms and maggots are doing some damage. The cold weather has retarded corn somewhat; acreage about the same as usual. Haying has not begun, except on very light land, but the crop will be a fair one. Early

potatoes have about the usual acreage, and are looking well except where damaged by frost. Early market-garden crops are looking well, but are late; asparagus is the only one marketed thus far. Quantity and price of dairy products about the same as usual. Pastures are in good condition at present, but rain is needed. Strawberries were injured somewhat by frost, but have done fairly well on land not too dry.

Mattapoisett (E. C. Stetson). — Potato bugs, squash bugs and cut worms are doing some damage. Indian corn is looking quite well, with about the usual acreage. Haying has not begun but there will be a fair crop. The acreage of early potatoes is about the same as usual, and the prospect for the crop is good. Early market-garden crops are about average in yield and price, and the prospect for later ones is good. There is not much change in the price of dairy products, but good cows are higher than formerly. Pasturage is in good condition. Strawberries, currants and raspberries are looking well.

Halifax (G. W. Hayward). — Potato bugs are doing some damage. Corn is very backward, with about the usual acreage. Haying will begin next week, with a fair crop. There is about the usual acreage of early potatoes, but they suffered from frost, so that the prospect for the crop is very poor. The quantity of dairy products is greater than last year, and prices are high; dairy cows are scarce and high. Pasturage is in very good condition, but needs rain. There will be a small crop of fruit, owing to damage from frost. Strawberries are a short crop, as the early blossoms were killed by frost.

BARNSTABLE COUNTY.

Bourne (D. D. Nye). — Potato bugs are doing some damage. Corn is looking well, but the acreage is below the average of previous years. Haying has begun; crop not up to last year in quality, but about average in quantity. The acreage of early potatoes is about average, with the promise of a good crop. Early market-garden crops are very backward, and none sold as yet, but the prospect is fair. We sell nearly all our milk and make scarcely any butter. Pasturage is very good in this locality, but is too closely fed. Strawberries and other small fruits were damaged by late frosts, and are reported to be very scarce in this locality. White grubs did much damage to the grass roots last fall, and those who did not re-seed have a very poor quality of crop for this year.

Mashpee (W. F. Hammond). — Fire worms, cut worms, potato bugs and rose bugs are doing some damage. Indian corn is looking well, with about an average acreage. Haying has not yet

begun, and there will not be more than a two-thirds crop. Early potatoes have about an average acreage, and are very promising. Early market-garden crops are below the average in yield and price. Quality, price and supply of dairy products about average; price of cows above average. Pasturage is in good condition. Strawberries are not over a one-third crop; no peaches; apples, pears, gooseberries, currants and quinces promise about average crops.

Barnstable (John Bursley). — Cut worms and white grubs are doing some damage. Indian corn looks fairly well, with about average acreage. Haying began on the 18th, with the prospect of a light crop. There is a full average acreage of early potatoes, but unless rain comes soon, the yield will be light. All market-garden crops are in need of rain. The quantity and price of dairy products is about the same as usual; price of dairy cows advanced 20 per cent. Pastures are drying up very fast. Cranberries are flowering, with a rather light bloom. Blackberries bloomed very full. Strawberries are a very small yield.

Harwich (A. N. Doane). — Indian corn is backward, with the acreage about the same as usual. Haying has not begun and the crop will be light. There is about the usual acreage of early potatoes, and they promise a fair crop. Pastures are in fair condition. Strawberries and grapes will give small crops; cranberries badly damaged by frost. We are having cold nights, which are unfavorable for all kinds of fruit.

Eastham (J. A. Clark). — No insects are especially troublesome. Very little Indian corn has been planted. Haying has not begun, except on very early fields. There is about the usual acreage of early potatoes, and they are looking well. The asparagus crop is light and prices good. Quantity and prices of dairy products and supply and prices of dairy cows average. Pastures are badly dried up, but will improve, owing to the recent rain. Strawberries are our principal small fruit and the drought has affected them badly.

DUKES COUNTY.

West Tisbury (Geo. Hunt Luce). — Potato bugs and cut worms are doing some damage. Indian corn is not very forward; acreage about the same as usual. Haying has not yet begun, but the prospect is for a fair crop. The acreage of early potatoes is about the same as usual, but they are rather later than usual, though they came up well and look thrifty. The prices for dairy products and dairy cows are somewhat higher than in former years. Pasturage is in good condition. Strawberries and apples promise good crops.

BULLETIN OF

MASSACHUSETTS BOARD OF AGRICULTURE.

POSSIBILITIES FOR FARM FORESTRY IN MASSACHUSETTS.

By ALLEN CHAMBERLAIN, *Secretary Massachusetts Forestry Association.*

Notwithstanding the innumerable articles which have been printed by the daily and weekly press of the whole country during the past five years on the subject of forestry in general, there still exists in the minds of many only a vague idea of the true meaning of the subject. This misunderstanding cannot be attributed to the fact that agitation in favor of forestry is new to this country, for it has been urged in this State of Massachusetts by individuals and societies for more than one hundred years. The failure to make the proper impression seems to be due to a too general treatment of the subject so far as the country at large is concerned, and in our own State to a too limited propaganda. All this talking has not been entirely in vain, however, for there have been and still are farmers in Massachusetts and in New Hampshire who have applied the science of forestry in part to their woodlands, and with profit to themselves and to their children. But the day of widely applied forestry is only just at hand, and our farmers are beginning to ask how it can affect them and their woodlots. That the farmers are generally becoming interested is the most hopeful sign of the century so far as this subject is concerned.

Although the subject has been agitated for so long a time, the first general public awakening to it was caused by President Cleveland's proclamation in February, 1897, by which 21,000,000 acres of government-owned timber lands were set aside as permanent national forest. For a time the people in those western States where these reservations were established struggled madly to secure

their annulment. Instead of abolishing these reservations, the next administration added others. By that time public opinion had changed, on a better understanding of the subject, and those who had clamored loudest against Mr. Cleveland's act were heard petitioning that yet other reserves be established. This was the beginning of a system of national forests, and the whole people believes in it to-day.

About the same time the State of New York began purchasing vast tracts of timber land in the Adirondacks and Catskills, and Pennsylvania soon after followed suit. This was the beginning of State forests in this country. Massachusetts has no such vast forest domains within her borders; nevertheless, she is doing her share in the application of the science at home, but in part for a different purpose.

That we may the better understand what we are doing as a nation and as a State in this matter of forestry, let us examine briefly into the reason for our doing it. Forestry is a science. So, too, is the practice of electricity. The time was when few believed that anything businesslike or commercial would develop from electricity. It was regarded as a theoretical science pure and simple. To-day vast capital is employed in promoting the many branches of the electrical business. Forestry also is capable of being made a profitable business. This has been sufficiently proven by the experience of European countries and communities during the last century.

One of the reasons why we as a nation have not embarked upon this enterprise earlier is that we have heretofore had an ample stock of virgin timber to draw upon, and many other more pressing problems to consider and dispose of. When our scientific men called attention to the fact that we were using nearly twice as much timber as our forests could possibly produce, provided even that they were well stocked and skilfully managed (which they were not), and that our farming and manufacturing interests would soon begin to feel the effect of a denudation of the hills which sheltered the source of their water powers, then we began to think deeply and to act as well.

Our great national timber tracts in the west are not to be held as public pleasure grounds pure and simple, as some have supposed. They are to be worked on a business basis, and their mature growth harvested and marketed for the good of the nation. Even if they fail for a time to do more than pay their own running expenses, there will still remain a distinct profit to the nation, in that the water powers rising in the midst of those forests will be insured for all time to the use of the irrigated farms and to the

mills of a wide section. To furnish timber and to conserve the water supply is the main purpose of those reserves, and the same is true of the New York and Pennsylvania reservations also. As a secondary consideration, they constitute vast public pleasure and hunting grounds. Of course we have those other reservations, the great national parks like the Yellowstone and Yosemite, which are pleasure grounds pure and simple, and whose timber is not to be considered in a commercial light. These stand in much the same relation to the nation as do the Blue Hills, Middlesex Fells, Mt. Greylock and Mt. Wachusett public reservations to the State of Massachusetts. They protect the water supply of certain areas, and furnish wild recreation grounds for vast numbers of people. These are not forests in the forester's sense of the word, and yet they represent one branch of the science, in that these woodlands are being cared for with a view to improving the native growth, that a perpetual wild forest may be maintained.

But Massachusetts has entered upon yet another piece of important forestry which has an indirect commercial side. This is the protection of one of our most important harbors and its neighboring town from a slow but certain engulfment in shifting sand. Provincetown, out on the tip of Cape Cod, is the proud possessor of the only good and available harbor between Boston and Martha's Vineyard; but, owing to the improvident cutting of the original growth of trees and beach sod along the eastern side of the cape, the storms have driven in the sand of the Atlantic until it stands to-day in miniature mountains, but moving mountains, over against the town and steadily creeping upon it. To stop this movement of the sand was the forester's work, and the State for the past five or six years has been working at establishing a plantation of pine and smaller growth along the seaward side, to anchor the sand and prevent further encroachment upon the town. A similar work was undertaken some years ago on the coast of France, and with entire success, and the work at Provincetown has thus far gone on prosperously. This is forestry of a thoroughly legitimate order, although it is not a plan to grow timber for market.

Massachusetts has therefore made a good beginning in State forestry, but it is all purely of a protective nature. Inasmuch as we have no great timber area like that in New York, there is no reason for the State to enter upon the cultivation of commercial timber. The application of this branch of forestry should be left in this State to private enterprise; and it is safe to predict that, if our own citizens do not undertake it, outside capital will eventually come in and begin operations. There is at least one such company established on Massachusetts territory to-day. It con-

trols at present some 5,000 acres in one township, and is negotiating for the purchase of more. It has even been reported on good authority that they hope to buy the whole township. Primarily this company was formed for the establishment of a game preserve; but it is known that they are already planning to start a forest, which they hope to make commercially valuable.

"Why not encourage such foreign capital to come in and do such work?" some one may ask. If they will consider the best interests of Massachusetts, it would surely be wise. But who wants to see acres of trees growing on land that is more valuable for agricultural crops? Forestry does not seek to ruin a country and turn it back from civilization to wilderness; the science of forestry is diametrically opposed to any such practice.

Our problem in Massachusetts is to keep what we have, and to improve it; hold fast to our tillage, and grow good crops thereon; hold on to our wood lots, and improve them; and, finally, make those old barren pastures, too poor to keep a sheep alive, and those low places, too wet for grass, grow marketable wood of some kind.

Let us see for a moment what our woodland represents to-day. By the last census, that of 1895, our wooded area is given as nearly 1,500,000 acres, and its value as almost $24,000,000. While this is a gain in woodland area in ten years of more than 71,000 acres, its valuation shows a shrinkage of something over $1,300,000 in the same period of time. In thirty years the value of our woodland has increased some $440,000, and the acreage increase shows almost identically the same figures. Judging by the census returns, the character of our woodlands appears to have improved on the whole in the ten years from 1885 to 1895, but the depreciation in value of more than $1,300,000 seems to indicate that further improvement is possible.

The same census shows that we have in permanent pastures, swamps and other waste country, some 250,000 acres less than in 1885. That in itself looks promising; but when we compare the values for 1885 with those of 1895, it is seen that there has been a falling off of almost $4,000,000. This would make this land worth more than $15 an acre, which is pretty high for waste country. The loss is not offset by a gain in arable land, for a loss is shown in that class, and with a gain in valuation, notwithstanding. The gain of 71,000 acres in woodland is not enough to balance it. Some of it may have gone into residential property, but still the tremendous loss in valuation remains.

Our farmers have an opportunity to make good this loss by making these lands, which are no better than a burden to-day,

yield a revenue to their owners and to the Commonwealth by planting trees upon them.

When it is deemed advisable to plant any part of the farm to trees, there are several points which should be carefully considered before even the variety of tree to be used is thought of. First, it should be determined whether the owner desires to realize from his labor by an actual harvest during his own lifetime, or merely to increase the value of his farm that he may sell it thus improved a few years hence with a promising growth of timber trees upon it, or to make the plantation in the nature of an investment for the benefit of his children. Having settled this phase of the problem in his mind, his next move is to study the character of the soil, to ascertain what varieties of trees it is best adapted to grow. It would then be well to write to the forester of the United States Department of Agriculture, stating the ultimate purpose in making such a plantation, what the general soil conditions are, and something about the lay of the land, its area, and to what use adjoining lands are put. He will thereby secure the best of professional advice as to his best course, and without charge.

As a rule, it is good policy to make use of native varieties when planting; and, on the whole, it is cheapest to use seedlings rather than seed. There are a few trees other than natives which will do well here under proper soil conditions; and among them may be mentioned the European larch, which is a more rapid grower than white pine, and which makes a fine, straight-grained and light building timber. The western hardy catalpa (*Catalpa speciosa*) is another tree which it is believed has great possibilities in this region. This again is a rapid-growing tree, making good railroad ties, posts, etc., in sixteen years from the seed. It has already been demonstrated by a western railroad that catalpa ties outlast all others, their life in mud ballast being over thirty years. In low, wet places the white willow (*salix lucida*) is a valuable tree. A growth of eight years makes charcoal stock, and anything up to four inches in diameter is available for the powder mills. White or swamp maple (*acer dasycarpum*) is another good tree for low ground, and its wood is in demand for last making. Both the willow and the maple sprout vigorously.

While it is much to be desired that the waste places on the farm should be made to yield a wood crop, it is hoped that the existing wood lot will not be neglected. It is most important that it should be improved and perpetuated. It would be a needless waste of space to enter here upon a discussion of the methods of planting or cutting, since the Federal Department of Agriculture has prepared an excellent little pamphlet of forty-eight pages on these

subjects. This pamphlet is known as "Forestry for Farmers," and a copy can be secured by any one who will address a postal card to the Secretary of Agriculture at Washington. Every farmer in Massachusetts should secure a copy, read its pages carefully, and keep it on his shelf for reference when he has work to do in his wood lot. Another government publication of great value, and which is sold for a nominal sum, is the "Primer of Forestry, Part I." Neither of these works deals in any language which cannot be understood by the average man. Both are written by practical and skilled foresters, and are among the best works on the subject for the use of farmers. The "Forestry for Farmers" tells how trees grow, about soil conditions, rate of growth and reproduction, how to plant a forest, what kinds of trees to use, the best methods of cutting in the wood lot, and something about the economic relation of the wood lot to the farm.

The most valuable woodland growths of our State to-day are doubtless the white pine and the chestnut. There is no trouble in keeping a chestnut growth perpetual, owing to the strong sprouting proclivities of the tree With pine it is different. Cut a pine lot clean, and a hardwood growth follows. Forestry proves that this is needless. A pine lot can be kept continually in pine, if enough old seed-bearing trees are left in suitable locations, and all fires and cattle kept out. A pine seedling is a very delicate plant, and the trampling of cattle or a light leaf fire will kill it at once.

Again, there is a great deal of white pine in this and in neighboring States that is growing under conditions which are most unsuitable and unprofitable. It is common enough to see an old pasture, for instance, growing up thickly to white pines. Few owners of such growth think of going near it to study the condition of the trees. For the most part they grow up as best they may, and at the end of forty years, say, they are cut and sold for cheap box boards. Where they stand thickly, at the end of the forty years the trunks are small, and covered with dry branches from butt to crown. Where they stand in comparatively open ground, they are larger in diameter, shorter, but covered with limbs, though these are mostly living. Now, every one knows that every limb, whether alive or dead, means a knot in the lumber which runs clear through to the heart; it is equally well known that clear lumber is worth many times more than knotty lumber; but it is not generally known that it is an easy matter to grow clear lumber, and thereby to produce a more valuable crop than is possible if the trees are left to take care of themselves.

The writer is personally acquainted with two men who have for years made it a practice to take care of their pine lands. One of

these men owns timber in Plymouth County, the other in southern New Hampshire, just over the Massachusetts line. In general their methods are alike, but in details of handling they differ. Both recognize the fact that young pines grow best when close together, thus shading and sheltering one another, or when coming up under the protecting wing of a brushy deciduous growth. Both go through their pines once a year, and thin out the poorest specimens, or the brush and sprouts, and thus give the young pines a good chance to push ahead. Both know the value of clear lumber, and take care, as the trees advance, to remove the lower limbs close up against the trunk, so that there remains no stub outside the bark, and consequently insuring clear timber beyond that point. Here is where they differ. The Plymouth County man trims his trees with a knife and thin-bladed axe, beginning when they are, say, five years old. The New Hampshire man waits till his trees are, say, ten years old, and then goes over them with a saw. The Plymouth man secures a greater proportion of clear lumber by beginning when his trees are very young, but the New Hampshire man contends that his timber sells well enough to suit him (and it may be added that he is a keen business man). The thinning process goes on from the first to the last. In cases where seedlings have been planted, it is often worth while to do the thinning for the first year or two with a spade rather than with an axe, especially in the case of fine, thrifty specimens that are crowding equally good ones. Thus many good seedlings can be secured to take the places of the few that die from natural causes, or to set out in new ground. As the trees grow toward maturity, the improvement cuttings can be utilized for firewood, or, if numerous enough, for lumber.

It has been sufficiently demonstrated in practice that this thinning and trimming is not expensive if done at times when there is little else demanding attention on the farm. A tree can be pruned at any season of the year when it is most convenient. In the case of the white pine, an exception might be made by those who consider outward appearances somewhat even in the timber lot. A pine trimmed in the spring or early summer will "bleed," and the stem will thereby be badly smeared with pitch. Authorities assert that this "bleeding" does not injure the tree, but it makes an unsightly forest. From August to March is the best time, therefore, to trim the pines; and most farmers will find this convenient for them, inasmuch as it is in the fall and winter that their greatest leisure comes.

A final word should be said concerning one of the most serious hindrances to timber growing, namely, woodland fires. Until this

annual evil is checked, it would be folly to invest much money or labor in timber lands. That it can be checked has already been proved by the States of Minnesota and Pennsylvania. Both of these States have been heavy sufferers in the past from forest fires, but the people at length awoke to the need of doing something drastic. Rigid laws were enacted, providing severe penalties for setting fires or for allowing brush fires to escape, and providing officers who are required under penalty to enforce them. These laws have been enforced, and with marked success. Pennsylvania, for instance, suffered an average annual loss for years of over $1,000,000. Since the passage of their fire law the average has dropped to a few thousand. Massachusetts has laws enough on this subject, but they are not enforced. The woodland of the State is valued at nearly one-third as much as all the farm buildings in the Commonwealth, and yet only a few towns think it wise to enforce the laws which are intended to protect all this property from needless losses.

The best fire law on the Massachusetts statute books is chapter 254 of the Acts of 1897; but before it can become operative in any town, it must be formally accepted by the voters at a town meeting. This law was passed at the urgent request of some of the Cape Cod towns which had been severe sufferers from fires. Those towns adopted the law at once, enforced compliance with its provisions, and the benefits have been marked. That this law is not more widely accepted must be due to one of two reasons, — either the people do not generally know of its existence, or they are unwilling to tax themselves for the support of this useful piece of machinery.

If any one doubts the need of seriously grappling with this fire problem, let him but consider the losses which the State sustains yearly from this cause. Our average loss is conservatively estimated at from $100,000 to $150,000. In 1895 nearly $50,000 worth of buildings were destroyed in the path of woodland fires. In 1899 returns were secured on 136 fires in 45 cities and towns, and these it was found burned over an area of 6,960 acres. There were known to have been many other fires throughout the State during that year, but reliable returns could not be secured regarding them. The immediate loss from the 136 fires on standing and corded wood amounted to $58,173, and on buildings which stood in the path of fires to $23,530; this makes a total loss of $81,703. This does not include the cost of labor employed in fighting the fires, which amounted to not less than $5,000.

These present losses do not, however, begin to cover the actual damages. Testimony secured from owners of timber and wood-

land in various parts of the State shows that even the lightest of leaf fires causes damage to growing trees which cannot be estimated in dollars and cents. It is the general opinion that, while light fires running in the dead and fallen leaves do little injury to old oaks and other thick-barked trees, such fires do kill quantities of valuable white pine seedlings, and they also set back for a year or two young deciduous seedlings. Oak, maple, birch and beech under fifteen years old are easily killed by a moderately hot fire, and much older trees are seriously injured and mature pine even killed by them. A forest will not wholly recover from a severe fire in thirty years. Not only is the growth damaged, but the soil is greatly impoverished by a hot fire. One instance may be cited where a good crop of fifteen-year-old hard wood was destroyed. It required five years for a new growth to become established, and this succeeding crop was composed of far less valuable varieties than the one destroyed.

It remains for the farmers themselves to say whether they will protect themselves against this annual scourge by adopting and enforcing the laws which have been provided for the purpose. Without some such insurance against fire loss, little enthusiasm can be expected on the subject of forestry.

SERIES OF 1900. BULLETIN NO. 3.

MASSACHUSETTS

CROP REPORT

FOR THE

MONTH OF JULY, 1900.

ISSUED BY

J. W. STOCKWELL,

SECRETARY STATE BOARD OF AGRICULTURE.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1900.

Crop Report for the Month of July, 1900.

Office of State Board of Agriculture,
Boston, Mass., Aug. 1, 1900.

Bulletin No. 3, Crop Report for the month of July, is herewith presented. Attention is called to the special article at the end of the bulletin, on "Birds as Protectors of Woodlands," by E. H. Forbush, Ornithologist to the Board.

Progress of the Season.

The July returns of the United States Department of Agriculture (Crop Circular for July, 1900) state that the preliminary returns of the acreage of corn indicate an increase of about 1,200,000 acres, or about 1.5 per cent, over the acreage harvested last year. The average condition, 89.5, is 3 points above the condition of last year, and 1.2 points below the ten-year average.

The condition of winter wheat shows a further decline during June, being 80.8 on July 1, as compared with 82.7 on June 1, 65.6 on July 1 of last year, and a ten-year average of 79.8. The average condition of spring wheat is 55.2, as compared with 87.3 a month ago, 91.7 on July 1 of last year, and a ten-year average of 89.5. The condition of spring and winter wheat combined was 69.8, against 76.2 on July 1 of last year, and 89.4 at the corresponding date in 1898. The amount of wheat remaining in the hands of the farmers is estimated at about 51,000,000 bushels, or 9.3 per cent of the crop of 1899.

The average condition of the oat crop on July 1 was 85.5, as compared with 91.7 a month ago, 90 on July 1 of last year, and a ten-year average of 87.3.

The average condition of barley was 76.3 as against 86.2 a month earlier, 92 on July 1 of last year, and a ten-year average of 88.3.

The average condition of winter rye was 89.6, as compared with 83.3 on July 1 of last year, and a ten-year average of 89.5. The average condition of spring rye was 69.7, as compared with 89.7 on July 1 of last year, and a ten-year average of 89.8.

There is an indicated increase of some 30,000 acres, or 1.2 per cent, in the acreage of potatoes. The average condition was 91.3, as compared with 93.8 on July 1 of last year, and a ten-year average of 93.2.

The average condition of sweet potatoes was highly favorable.

Reports on timothy and clover were exceedingly unfavorable, there being few States which did not report a condition considerably below the ten-year average.

Though the condition of apples declined from that of June 1, there was still the promise of an exceptionally large crop. The condition of peaches was such as to give promise of a phenomenally large crop, and the average condition of grapes was considerably above the ten-year average.

The average condition of cotton was 75.8, as compared with 82.5 the previous month, 87.8 on July 1 of last year, and a ten-year average of 87.9.

In Massachusetts the acreage of corn as compared with last year was 101, and the average condition July 1, 90; the average condition of oats, 98; the average condition of barley, 90; the average condition of spring rye, 96; the acreage of potatoes, 102, and the average condition, 95; the average condition of tobacco, 95; the average condition of clover, 84; the average condition of timothy, 84; the average condition of pasture, 84; the average condition of apples, 89; and the average condition of grapes, 92.

Temperature and Rainfall for the Whole Country.

[From the United States Climate and Crop Bulletins.]

Week ending July 2. — The week averaged slightly cooler than usual in the central Gulf States and over the extreme northern portion of the country, from the Lake region to the Pacific coast. In California, southern Texas, the Ohio and central Mississippi valleys and northern New England nearly normal temperature conditions prevailed.

Along the Atlantic coast from Florida to southern New England the week averaged from 3° to 4° warmer than usual, and it was also warmer than usual in the central and southern plateau regions, and throughout the south-eastern Rocky Mountain slope. Very heavy rains fell over portions of the central Gulf States, Tennessee, the greater part of the Ohio valley and portions of Arkansas, Missouri, Kansas and Iowa. Along the Atlantic coast, over the greater part of the Lake region, in the upper Mississippi and Missouri valleys the rainfall was below the average, New England and the Middle Atlantic States receiving no appreciable amount.

Week ending July 9. — The week averaged warmer than usual in nearly all districts east of the Rocky Mountains and on the middle Pacific coast, being decidedly warm in the central valleys and Middle Atlantic States. The week was cool throughout the northern plateau region, and during the first half over the Middle Rocky Mountain slope and upper Missouri valley. In the lower Missouri, central Mississippi and Ohio valleys, portions of the central and east Gulf States and generally throughout the Atlantic coast districts, the rainfall was below the average, limited areas of these districts receiving no appreciable amount. From the upper Missouri valley eastward over the Lake region, in northern and eastern Texas and over limited areas in the east Gulf States and on the Middle Atlantic coast there was more than the usual amount.

Week ending July 16. — The week was not as warm as usual in the upper Mississippi valley, Lake region, Ohio valley and southern States, and the temperature was also slightly below normal in Oregon and eastern Washington. Throughout the Rocky Mountain and plateau districts, the lower Missouri valley and along the Atlantic coast northward from Virginia the week averaged warmer than usual. The first half of the week was warmer and the latter half cooler than usual in New England. Very heavy rains fell in central, southern and eastern Texas, in the central Missouri and upper Mississippi valleys, northern portion of the Lake region and over local areas of the lower Lake region, Ohio valley and east Gulf States. The week was dry in the Middle Atlantic States, Tennessee, over much of the Ohio

valley and throughout the Rocky Mountain and plateau districts.

Week ending July 23. — The week was exceptionally warm in the Atlantic coast districts, from the Carolinas northward, especially over the interior. The week was also warmer than usual on the north Pacific coast. Over the western half of the Lake region, and generally throughout the Mississippi and lower Missouri valleys, the week was not as warm as usual. Unusually high maximum temperatures occurred in New England and the Middle Atlantic States on the 16th and 17th. Very heavy rains fell in northern Texas and Louisiana, and more than the usual amount fell over the greater part of the Lake region and Ohio valley and over portions of the upper Mississippi and central Missouri valleys. There was less than the usual amount of rain on the Atlantic coast, except over limited areas, a considerable portion of the South Atlantic States and New England receiving no appreciable amount.

Special Telegraphic Reports.

[Weather Bureau, Boston.]

Week ending July 2. — New England. Boston: Heavy rains and violent storms Wednesday and Thursday; light crop of hay; small grain generally promising; fruit prospects good; tobacco uneven and late, hoed twice.

Week ending July 9. — New England. Boston: First four days cool, last three excessively warm; very little rain, many thunder-storms; rain needed; rye average yield; much of oat crop cut for fodder, below average; early corn promising, late, poor; tobacco improving; apples falling; berries shrivelling; pastures generally inferior.

Week ending July 16. — New England. Boston: Severe thunder-storms, with heavy rain; wet weather interfered with haying in northern New England, but increased hay crop; harvesting rye and winter wheat in southern portion, heavy crops; apples continue to fall, outlook less promising; raspberries average; grapes abundant; tobacco thrifty.

Week ending July 23. — New England. Boston: Rain generally needed, drought severe in central and southern sections, where gardens are drying up, fields and pastures

brown, and potato crop a failure; hay of good quality, two-thirds average crop; tobacco doing well; apples continue dropping.

The Weather for July, 1900.

The month of July was characterized by varied and extreme conditions of weather. The opening days, and until the 6th, the temperature averaged from two to five degrees below normal. During this period there was much cloudiness, although the rainfall was light, averaging about four-tenths of an inch. The rainfall was the result of local showers fairly well distributed through the week. The second and third weeks were excessively warm, the mercury being almost continuously above the normal. The warm wave was most intense from the 16th to 18th inclusive, during which the maxima temperatures ranged in the 90s, occasionally reaching 100°, in the shade, and the minima falling but slightly, if any, below 80°. The weather in the mean time was clear to partly cloudy, with a general deficiency of rain. The only showers of consequence were on the 12th and 18th. These were very irregular in amounts and distribution. In some instances there were down-pours of from one to two inches, while in others the amounts were inappreciable. A season of cool weather obtained from the 20th to 22d, with the maximum temperatures in the 80s. This was followed by a few days of moderate summer heat, resulting in a general rain-storm on the 25th and 26th. The rainfall during this storm was generally copious. It was most timely and of inestimable value to agricultural interests throughout the State. The month closed with several days of fair weather, with the average amount of sunshine and temperatures ranging near the seasonal average. Excepting the unfavorable conditions resulting from the deficiency in rainfall, the weather of the month was generally favorable to crops and farming operations.

In the circular to correspondents returnable July 23 the following questions were asked: —

1. What insects are proving most troublesome in your locality?

2. What is the condition of Indian corn, and what proportion of the crop will be put into the silo?

3. What is the quantity and quality of the hay crop as compared with former years?

4. What forage crops are being raised to supplement the hay crop, for the silo, and to eke out the pastures; what is their condition and are more raised than usual?

5. What is the condition of market-garden crops, including potatoes, and how have those already harvested compared in yield and price with former years?

6. What is the prospect for apples, pears, peaches, plums, quinces, grapes and cranberries?

7. What is the condition of pasturage in your locality?

8. How have rye, oats and barley compared with former years, both as grain and forage crops?

Returns have been received from 155 correspondents, and from them the following summary has been made up: —

Insects.

No noticeable damage from insects is reported, if we except that from the pea louse, a new insect which has done great damage to the pea crop in some market-garden sections. Potato bugs are generally reported, but not as doing any unusual amount of damage. Other insects spoken of are currant worms, squash bugs, cabbage worms, tent caterpillars, canker worms, elm leaf beetles, horn flies, rose bugs, codlin moths, asparagus beetles, pear tree psyllas, grasshoppers, plant lice, corn worms, white grubs, cut worms, curculios, and squash vine borers.

Indian Corn.

Indian corn is generally in first-class condition in western and central sections, though perhaps a little late. In the eastern part of the State it was suffering from drought prior to the rain of the 25th and 26th, though not as badly as most other crops. The recent rain should have relieved this condition and it should do fairly well with a proper amount of moisture from now on. As always, more corn is used for ensilage in Worcester County than elsewhere, the southeastern counties being those where there are the fewest silos.

The Hay Crop.

At the time of making returns haying was practically completed. From two-thirds to three-fourths of a full crop is the favorite estimate as to quantity, with perhaps nearer an average crop in eastern and south-eastern sections, if Barnstable County be excepted. The quality of the crop is generally said to be good and it was mainly secured in first-class condition.

Forage Crops.

The short hay crop has led to a considerable increase in the acreage of forage crops all over the State. Fodder corn is the crop most extensively used for this purpose, closely followed by oats, Hungarian grass, millet and barley. Other crops reported as grown for forage are oats and peas, barley and peas, rye, peas, soy beans, cabbages and roots. In western and central sections they were generally reported to be in fair condition, but in eastern counties they were suffering badly from drought at the time of making returns, a condition probably relieved by the rain of the 25th and 26th.

Market-garden Crops.

Market-garden crops were generally suffering from drought, those now ready for market being short crops in the principal market-garden sections, and later ones at a stand-still before the rain. These should now do well with seasonable rains. Prices average about as usual.

Early Potatoes.

At time of making returns early potatoes were being dug in many places. The crop has apparently suffered much from drought in nearly all sections, the rain coming too late to materially aid it, and there are numerous reports that it is nearly or quite a failure. Prices are reported as lower than usual, a surprising condition in view of the short crop. The late crop should do well with rain as no blight is reported.

Fruits.

Apples dropped badly during the month and the crop will hardly come up to earlier expectations. Pears will be a fair crop; plums light; peaches a light crop, but still well up to the average; quinces a good crop as far as reported on; grapes generally promise well. Not enough returns were received in regard to cranberries to warrant any remarks upon them. All fruits suffered somewhat from drought in eastern sections.

Pasturage.

At the time of making returns pastures were in need of rain in all sections, and in eastern sections were generally reported as being dry and brown. The recent rain should help them in western and central sections, but it is feared that they have suffered to severely in the eastern counties to make more than a partial recovery possible this season.

Small Grains.

Rye, oats and barley matured early enough to escape the greater part of the drought, and were generally good average crops where cut for grain.

NOTES OF CORRESPONDENTS.

(Returned to us July 23.)

BERKSHIRE COUNTY.

Mount Washington (H. M. Weaver). — Potato bugs are doing some damage. Corn is doing well now and about half of it will go into the silo. The hay crop was good in quality but short in quantity. Southern corn is the principal forage crop raised. Potatoes are yielding well and are lower than ever in price. The prospect is good for apples, pears, peaches, plums and cranberries. Pasturage is short and is growing slowly. Rye and oats are up to the average both as grain and forage crops.

Tyringham (E. H. Slater). — Indian corn is an average crop and about one-eighth of the crop will go into the silo. The hay crop was about the same as last year in quantity and of better quality than usual. Sowed corn, oats and peas are the principal forage crops raised. Potatoes are looking well, but none are harvested as yet. Apples are about half a crop, and there is a good supply of pears, plums and grapes. Pasturage is showing the effect of dry weather. Rye, oats and barley compare favorably with former years. We have had a few heavy showers which have helped out the pastures and the hay crop wonderfully. Tobacco is a little late but is a good crop.

Becket (W. H. Snow). — Potato bugs are doing some damage. Indian corn is late but is looking well; three-fourths of the crop will be put into the silo. Hay was a light crop, of good quality. Oats and Hungarian grass are the principal forage crops raised. No potatoes have been dug as yet. The prospect for fruit is not very good. Rye, oats and barley are fully as good as usual.

West Stockbridge (Wm. C. Spaulding). — Currant worms and potato bugs are doing some damage. Corn is an excellent crop; no silos about here. The hay crop was fully up to the average both in quantity and quality. Fodder corn and roots are the principal forage crops and they are in good condition. Market-garden crops are looking well; potatoes not ready to harvest yet, new ones retailed at $1 per bushel. Apples and grapes promise well; few pears; peaches, plums and quinces scarce; no cranberries. Pasturage is in good condition. Rye, oats and barley are average crops. Frequent showers have kept crops going in good shape.

Washington (E. H. Eames). — Potato bugs are doing some damage. Indian corn is a good crop and about half of it will go into the silo. Hay was not half as heavy a crop as last year, but the quality was good. No forage crops have been put in to supplement the hay crop as yet. There

will be a very light crop of all kinds of fruit. Pastures are in very good condition. Rye and oats are about the same as in former years.

Hancock (C. H. Wells). — Potato bugs are doing some damage. Corn is a little late but is looking well; no silos in town. Quality of hay crop good, but quantity 25 per cent short of a full crop. No forage crops are raised to supplement the hay crop. Potatoes are looking well and promise a big crop. There will be a fair crop of apples, but only a few pears and plums. Pastures are in fine condition. Very little rye is raised, but the quality is good; too early for oat harvest, but they look first rate and will probably yield well.

Cheshire (L. J. Northup). — Potato bugs are doing some damage. Indian corn has grown rapidly in the past few days and is nearly up to the average. The hay crop will be about 80 per cent of a full crop and the quality compares favorably with former years. Fodder corn and millet are the principal forage crops; condition fair and fully as much raised as usual. Market-garden crops are looking well; early potatoes promise well; prices low. Apples are dropping but promise a good crop; pears and plums are good crops. Pastures are becoming short although comparing favorably with former years. The grain crop is well up to former years in quality and quantity, oats being heavy.

New Ashford (Elihu Ingraham). — Potato bugs are doing some damage. Corn is a good crop and none of it will be put into the silo. The hay crop is better than last year in quantity and the quality is good. No forage crops are raised here. Market-garden crops are in good condition, with prices about as in former years. The prospect for apples is fair; no other fruits grown here. Pasturage is in fair condition. Oats look finely; no rye or barley raised.

FRANKLIN COUNTY.

Rowe (J. F. Brown). — Potato bugs are doing some damage. Corn is looking well and about one-tenth of the crop will go into the silo. Hay was about a three-fourths crop of average quality. Corn, barley and oats are the principal forage crops raised; condition good; more raised than usual. Apples are looking well and promise a large crop; other fruit not raised for market. Pasturage is injured for the want of rain and is poor. Oats and barley are looking fully up to former years.

Colrain (A. A. Smith). — Potato bugs are doing some damage. Indian corn is a fair crop and about half of it will be put into the silo. The hay crop was not up to the average in quantity but above in quality. Corn for silage is the principal forage crop. Market-garden crops, including potatoes, are about as usual, with prices about average. The prospect is not good for the fruit crop. Pasturage is dry. Rye, oats and barley are not up to the average.

Gill (F. F. Stoughton). — Indian corn is late but is of good color; the recent rains will help it greatly. Hay was less than an average crop in quantity but of good quality. Rye, oats and fodder corn are the principal forage crops raised and corn is the principal crop raised for the silo. There will not be a heavy crop of apples. Pastures are in good condition. Rye and oats are extra good crops.

Ashfield (Chas. Howes). — Potato bugs are the most troublesome insect at present. Corn is a little backward but is looking finely; probably three-fourths of it will be put into the silo. There is rather a light crop of hay, of excellent quality. Sweet corn, oats and barley are raised to help out the hay crop and the pastures, and considerably more than usual have been put in. Garden crops and potatoes are looking finely, though few potatoes have been dug. There are plenty of apples, but pears and other fruits are rather off. Pastures are in good condition for the time of year. Rye, oats and barley are mostly raised for forage and are fully up to the average.

Deerfield (Chas. Jones). — Potato bugs are doing some damage. Indian corn is a fair crop and not over a tenth of it will go into the silo. Hay is not an average crop but the quality is good. No forage crops are raised to help out the hay crop and the pastures. Early potatoes are more than average crops and market-garden crops are a good average. Apples will not be an average crop and there are few pears and no peaches. Pasturage is in very poor condition. Rye and oats are looking well but are little raised.

Erving (C. F. Clark). — Potato bugs are doing some damage. Indian corn is a good crop; only a small portion of it will go into the silo. Hay is not over a two-thirds crop, of about the usual quality. Fodder corn is the principal forage crop raised and is in good condition, with about the usual amount planted. Market-garden crops are good and early potatoes about average. There will not be a large crop of any kind of fruit. Pastures are in good condition for the season. Rye, oats and barley are average crops.

Wendell (N. D. Plumb). — Tent caterpillars and potato bugs are doing some damage. Indian corn is in good condition and about half the crop will go into the silo. The hay crop was of good quality, but was the smallest for years. Farmers are putting in many acres of Hungarian grass and it looks very promising. Potatoes look well but there are not many in the hill. The prospect for fruit of all kinds is the best for years. Pastures are in good condition. Rye, oats and barley are about normal crops.

New Salem (Daniel Ballard). — Currant worms have been quite destructive, and we have plenty of potato bugs. Corn is backward, but of good color and growing well; a small proportion will be put into the silo. We have a light hay crop but the quality is good Corn, oats, peas and oats, and some Hungarian grass are put in for forage; they are looking well, with a somewhat increased acreage. There are but few potatoes harvested as yet. There will be a medium crop of apples, pears, and peaches; grapes more abundant. Pasturage is rather light and dry; we have had some showers but hardly enough to keep up its condition. Rye, oats and barley are apparently fair average crops.

HAMPSHIRE COUNTY.

Prescott (W. F. Wendermuth). — Potato bugs are doing some damage. Indian corn is in average condition; there are but three silos in town. Hay was a two-thirds crop, of good quality. Oats and corn are

the principal forage crops raised and are in good condition. Apples will be a full crop; other fruits two-thirds crops, except peaches, which are a failure. Pastures are very dry and short. Rye, oats and barley are nearly average crops.

Amherst (W. P. Brooks). — The elm leaf beetle is doing much damage. Corn is in excellent condition; nearly two-thirds the total acreage will go into the silo. The hay crop was about average, both as to quality and quantity. Fodder corn, Japanese barn-yard millet, Hungarian grass and oats and peas are the principal forage crops; no material increase in acreage; condition good. Cabbages and potatoes are unusually good; sweet corn nearly ready to pick and good; tomatoes good and beginning to ripen; beets unusually good; peas below average; beans above average; other market-garden crops good. Apples promise well; peaches, plums, quinces and grapes the same; but few pears; no cranberries raised. Pasturage is in average condition. Rye is above the average.

Hadley (H. C. Russell). — Potato bugs are doing some damage. Indian corn is fully up to the average and 5 per cent of the crop will be put into the silo. Hay was less than an average crop although better than last year; quality good. Oats and Hungarian grass are the principal forage crops and about the usual amount has been put in. Early potatoes are a good crop. There is a fair crop of fruit, but not an excessive one, as the bloom promised. Pasturage is in good condition. Rye, oats and barley are average crops in quantity and quality.

South Hadley (H. W. Gaylord). — Potato bugs and squash bugs are more numerous this year than for the last five or six years. Corn looks finely and has made rapid growth the last two weeks; probably fully one-half the crop will go into the silo. Hay was from two-thirds to three-fourths a normal crop, of good quality. Corn, millet, Hungarian grass, barley and peas are being sown for forage; condition good; acreage increased one-third. Market-garden crops are generally doing well, with fair prices; early potatoes are a failure. Fruit of all kinds, with the exception of grapes, is dropping badly and does not promise well. Pastures are very short and dry. Rye and early sown oats and barley are good crops.

Southampton (C. B. Lyman). — Potato bugs have been very plenty. Corn is in good condition but needs rain; but a small part will be put into the silo. The quantity of the hay crop is not up to the average but the quality is of the best. Corn and millet are the principal forage crops grown. Market-garden crops have suffered from drought; early potatoes are almost a failure. Apples, pears, peaches and plums will be very light crops; grapes a good crop. Pastures are sear and brown. Rye, oats and barley are about average crops.

Chesterfield (Horatio Bisbee). — Potato bugs are not as prevalent as usual. Corn is looking well and not over one-fourth of the crop will go into the silo. Hay was not over a two-thirds crop, but the quality was good. Corn is the principal forage crop grown and is in fair condition. Apples are the only fruit raised for market and are not very promising. Pasturage is in fairly good condition.

Cummington (S. W. Clark). — Potato bugs are doing some damage. Indian corn is backward; half the crop may be used for silage. Hay was about two-thirds of an average crop, of first-class quality. Corn, Hungarian grass and oats and peas are the principal forage crops; they look very well and more than usual have been put in. Gardens look well and potatoes finely. The prospect is good for fruits and blackberries promise well. Pastures are in very good condition; much better than last year. Rye, oats and barley are about average crops. No rain storm for many weeks, but showers have been frequent and have kept crops growing fairly. Streams are very low.

HAMPDEN COUNTY.

Chester (P. M. Adzima). — Potato bugs are doing some damage. Indian corn is about a week late but in good condition; half the crop will be put into the silo. The hay crop is light but of good quality. Corn, oats, barley and Hungarian grass are the principal forage crops grown; about the usual amount put in and condition good. Market-garden crops are fair and potatoes are yielding well. The prospect for fruits and berries is good. Pasturage is in good condition. Rye, oats and barley are about average crops.

Granville (Joseph Welch). — Potato bugs are doing some damage. Corn looks very well; none is used for silage. Hay was from one-half to two-thirds of a crop. There will be a fair crop of potatoes if we have rain. In some parts of the town there will be a good crop of apples, in other parts none. Pastures are drying up and rain is needed. Rye, oats and barley are about average crops.

West Springfield (T. A. Rogers). — Potato bugs and horn flies are doing some damage. Corn is a little late but is looking well; only a small part of the crop will go into the silo. The hay crop was light in quantity but good in quality. Corn, oats and Hungarian grass are the principal forage crops raised. Market-garden crops have been affected by drought; potatoes blighted, tubers small; prices low. Apples fair; pears light; very few peaches; some plums; quinces and grapes full average crops. Pasturage is very short on dry lands and fair on moist lands. Rye and oats are extra good crops.

Agawam (Reuben DeWitt). — Potato bugs have not been very troublesome. Early planted corn looks well; that planted late on dry lands looks poorly. Rye is the principal crop raised for green feed, and barley and oats are planted to eke out the hay crop. Potatoes are low in price and look as if the yield would be slim. Apples are a small crop; pears good in some orchards; peaches scarce; plums abundant. Pastures are suffering from drought. Rye, oats and barley compare favorably with other years as forage crops.

Longmeadow (W. F. Emerson). — Potato bugs, elm tree beetles and pea lice are doing some damage. Light rains occasionally are keeping corn looking well; one-third the crop will go into the silo. The quantity of the hay crop was less than usual, particularly on old mowings, but the quality was good. Hungarian grass, corn, oats and a little barley are the forage crops grown, and rather more than usual have been put in.

Potatoes will probably be a light crop. There are no apples to speak of; other fruits uneven; good crops in some cases in others not. Pasturage has been holding out well though perilously near injury from drought at times. Rye is a good crop; oats rather light.

Hampden (J. N. Isham). — Corn is in good growing condition; about one farmer in forty has a silo. The hay crop was nearly up to last year in quantity and of excellent quality. Corn and oats are the principal forage crops raised and are in good condition, with increased acreage. Garden crops are in good condition; potatoes are a fair yield with medium prices. Apples and pears good; some peach orchards good, others poor; plums poor and natives show some rot. Pasturage is fairly good but is beginning to show need of rain. Rye a little short from winter killing; oats a good average crop.

Holland (Francis Wight). — Potato bugs are doing some damage. Indian corn is in good condition; no silos in this town. Hay was not over a two-thirds crop but the quality was good. Corn and oats are the principal forage crops grown, with an increased acreage. Market-garden crops are in good condition. All fruits except grapes and cranberries will be below the average. Feed in pastures is short and not fresh and green. Rye, oats and barley are rather above the average.

Palmer (O. P. Allen). — Potato bugs are our most troublesome insect. Indian corn is rather backward but is coming on fast now. The quantity of the hay crop is less than usual but the quality is good. Corn is the principal forage crop grown and there is the usual amount this year. Market-garden crops are about as in former years as regards condition and price. Fruit is below the average in condition. Pasturage is good as a rule. Rye, oats and barley are about average crops.

WORCESTER COUNTY.

North Brookfield (J. H. Lane). — Potato bugs are doing some damage. Indian corn is in good condition and about 10 per cent of the crop will go into the silo. Hay was a little over a three-fourths crop, of fine quality. Corn and Hungarian grass are the principal forage crops grown. Prices for market-garden crops are very low and early potatoes bring but 50 cents a bushel. Apples and pears are half a crop, plums a one-third crop, and grapes a full crop. Pastures are now getting dry, but feed has been good up to within a few days. Rye, oats and barley are extra good crops.

Spencer (H. H. Kingsbury). — Potato bugs are doing some damage. The warm weather has caused a fine and very thrifty growth of corn; about one-fourth of the crop goes into the silo. Hay was about a three-fourths crop, of excellent quality. On account of expected shortage of hay an extra area has been devoted to fodder corn, millet, etc., and they are making a fine growth. All market-garden crops are very thrifty and potatoes are especially fine. The prospect is for a very large crop of apples, with a few pears, peaches and quinces, and an average crop of grapes. Pasturage has been in good condition but is now getting short. Oats and barley have made a good growth and were nearly all hayed.

Rutland (L. S. Dudley). — Potato bugs are doing some damage. Indian corn is in good condition and nearly all the crop will go into the silo. Hay was about half a crop, of good quality. Corn is the principal forage crop raised, with about the usual acreage. Market-garden crops are in good condition; no potatoes dug as yet. Pasturage is rather short. Rye, oats and barley are about average crops.

Hubbardston (C. C. Colby). — Tent caterpillars, potato bugs and pea lice are doing some damage. Corn is looking well but is backward; about three-fourths the crop goes into the silo. Hay was only about a two-thirds crop, of good quality. A large amount of Hungarian grass, oats and barley has been put in and some corn planted as late as July 9. Potatoes are looking well, with the prospect of a good yield. The prospect for apples, pears and grapes is good. Oats and rye have made a heavy growth.

Petersham (S. B. Cook). — Potato bugs and rose bugs have done some damage. Indian corn is in good condition and one-third of the crop will go into the silo. Hay was a three-fourths crop, of good quality. Corn is the principal forage crop raised, with some Hungarian grass, oats and millet. Market-garden crops are in good condition; yield and price of early potatoes about as in former years. Apples and grapes will be plenty; pears and quinces few; peaches and plums a failure. Pastures are in only fair condition, as feed is getting short. Rye, oats and barley compare favorably with former years.

Templeton (Lucien Gove). — Potato bugs, rose bugs, asparagus beetles, cabbage worms and codlin moths are doing some damage. Corn is more than a week late and quite uneven; more than 75 per cent of the crop will go into the silo. Hay was not over a half crop but the quality was good. Oats, barley, Hungarian grass and millet are the principal forage crops grown, and they are below average in condition because of drought. The outlook is not favorable for full yields of market-garden crops; yield of potatoes light, prices somewhat higher. Apples are fair average crops; pears light; no peaches; plums light. Pasturage is below the average in condition. Rye, oats and barely are lighter than usual and are heading out low.

Ashburnham (Albert Needham). — Potato bugs and horn flies are doing some damage. Corn is rather backward and about half the crop will be used for ensilage. Hay is generally of good quality and about 60 per cent of an average crop. More forage crops than usual are being grown, consisting largely of corn, Hungarian grass, oats and barley. Potatoes are looking well. The apple crop will be rather small for the bearing year. Pasturage is drying up and unless rain comes soon stock will have to be fed at the barn.

Fitchburg (Dr. Jabez Fisher). — Potato bugs and the pear psylla are doing some damage. Indian corn looks fairly well but needs moisture; most of the crop will go into the silo. Hay was not over a two-thirds crop but was of good quality. Drought cuts all market-garden crops short and prices are low for potatoes. Apples will be a full crop; pears 75 per cent; peaches 50 per cent; plums 80 per cent; grapes 85 per cent. Pastures are short for lack of rain.

Bolton (H. E. Babcock). — Potato bugs are doing some damage. Corn is looking well and fully one-half the crop will be put into the silo. Hay was hardly an average as to quantity but was of good quality. Oats and barley are the principal forage crops grown. Market-garden crops and potatoes are light crops, with average prices. There will be an average crop of apples, pears and grapes; but very few peaches, plums, quinces and cranberries. Pasturage is very short and dry. Rye, oats and barley are very good crops.

Worcester (H. R. Kinney). — Potato bugs and grasshoppers are doing some damage. Corn is late and in many places is suffering from drought; a large portion of the crop goes into the silo. The hay crop is very light on old fields, fair on new ones; quality good. Oats are about the only forage crop raised except corn, though a few sow barley. Potatoes seem almost a failure; market-garden crops fair and prices satisfactory. Fruit promises a good crop in some places. Pastures are in very poor shape and need rain badly. Rye, oats and barley are all cut green, and while light, have mostly been secured in good condition.

Milford (J. J. Nutter). — Potato bugs are doing some damage. Corn is looking very well and only a small proportion of it will go into the silo. Hay was a light crop. Corn is the principal forage crop raised; condition good and about the usual quantity planted. The condition of market-garden crops is very good and prices are about as last year. The prospect is good for apples; other fruit not much grown. Pasturage is in poor condition. Rye, oats and barley are average crops.

Hopedale (Delano Patrick). — Potato bugs are doing some damage, though less than usual. Corn is doing well and perhaps two-thirds of the crop will go into the silo. The hay crop was somewhat off in quantity but was of good quality. Indian corn is the principal forage crop grown, with about the usual acreage. Market-garden crops are doing well; potatoes yield well; prices for both a little lower than usual. The prospect is good for apples. Pasturage is not in very good condition. Rye, oats and barley are not much sown in this vicinity.

Uxbridge (Augustus Story). — Pea lice, squash bugs and elm leaf beetles are doing some damage. Corn is small and greatly in need of rain; about one-third of the crop will go into the silo. Hay was generally a good crop, well up to former years in quality. Oats are the principal forage crop used and more than usual have been planted. Market-garden crops are looking well, though the heat and drought are injuring them now; prices same as last year. Fruit promises well and peaches are looking better than was expected earlier in the season. Pastures are drying up badly. Oats have done well.

MIDDLESEX COUNTY.

Ashland (C. F. Adams). — Indian corn is a good crop and one-tenth of it will go into the silo. Hay was about 85 per cent of an average crop, of good quality. Hungarian grass, corn and barley are the principal forage crops raised and are in good condition. Market-garden crops are in good condition, with average prices prevailing. There will be

about half a crop of fruit. Pasturage is in poor condition. Rye, oats and barley are average crops.

Maynard (L. H Maynard).— Squash bugs are doing some damage. Dry weather has shortened the corn crop; probably three-fourths of it goes into the silo. The hay crop is below the average in quantity and quality. Hungarian grass is the principal forage crop raised and will be light, owing to the extreme dry weather. Market-garden crops are suffering for rain; no potatoes dug as yet. Apples will be half a crop; grapes a full crop; other fruits about normal. Pastures are all dried up and there is apparently no feed in them. Rye, oats and barley have been average crops.

Stow (G. W. Bradley).— Potato bugs and grasshoppers are doing some damage. Indian corn is very backward and needs rain; probably one-fourth of the crop will go into the silo. The quantity of the hay crop was light and the quality good. Hungarian grass, corn and oats are the principal forage crops, and they are not looking very well on account of drought. Apples are dropping badly; pears and peaches light; grapes fair. Rye, oats and barley are about average crops.

Boxborough (J. F. Hayward). — Potato bugs and the striped squash bug are doing some damage. Indian corn is looking well where it is not injured by dry weather; those who have silos put in about all they raise. The hay crop was about a two-thirds crop in quantity but was of good quality. Fodder corn, millet and Hungarian grass are the principal forage crops raised and more corn than usual has been put in. The drought has lessened the yield of market-garden crops but prices are a little higher than usual. There is a good prospect for late apples and a fair prospect for pears, peaches, plums and grapes. Dry weather is making the feed in pastures short. Rye, oats and barley are average crops.

Dunstable (A. J. Gilson).— Potato bugs and the black squash bugs are very troublesome this season. Indian corn needs rain, as it is fast turning yellow, with indications of a light crop; only a small portion of it is put into the silo. The hay crop was below the average in quantity but of very good quality. Corn, Hungarian grass, oats and barley are the principal forage crops grown; late sown crops are growing slowly, with the acreage rather larger than usual. No market-garden crops or potatoes have been harvested, but the outlook is for light crops. Apples promise a medium crop; no pears; some peaches on high land; no plums or quinces; grapes light; cranberries bloomed full. Pastures are very dry and short of feed. Rye and oats compare favorably with former years.

Carlisle (E. J. Carr). — Potato bugs and asparagus beetles are doing some damage. Indian corn has been much injured by dry weather, a large per cent being past help from rain; very little if any goes into the silo. Hay was much below the average in quantity but of the best quality. A large amount of millet and late corn have been put in but are in very poor condition, dry weather and heat having ruined most of it. Market-garden crops have been badly injured by dry weather and

make small yields. Apples, peaches and grapes set well; no cranberries, pears, quinces or plums. Pasturage is all burnt up by the dry weather. Rye, oats and barley are much below the average.

Bedford (Henry Wood).—Canker worms and tent caterpillars are doing very little damage. Corn is drying up very fast; a considerable proportion of the crop goes into the silo. Hay was not over half a crop on most farms. Corn and millet are the principal forage crops grown. No potatoes have been dug as yet. There will be about half a crop of apples and pears, with some peaches and a fair crop of grapes. Rye has done fairly well, oats not as well.

Lincoln (Samuel Hartwell).—The hay crop was small and poor on dry land but good on moist land. Oats and corn are the principal forage crops; condition poor and no more than usual raised. Market-garden crops have suffered from drought and potatoes will be a light crop. Apples are plentiful in number but are small; pears, peaches and plums in fair quantity; grapes plenty. Pastures are in poor condition, being all dried up. Winter rye is raised considerably for early feeding and is in good condition. All growing crops have suffered from drought and in many cases are past redemption.

Woburn (W. H. Bartlett).—Potato and squash bugs are doing some damage. Sweet corn for market is raised in this vicinity. The hay crop was about a three-fourths crop in quantity; quality very good and put in the barn in fine condition. Corn and Hungarian grass are the principal forage crops and about the usual amount have been put in. Market-garden crops have yielded poorly, with prices about as in other years. Potatoes look well; none dug as yet. Apples will not be over half a crop, being wormy and dropping badly; peaches and pears light; plums, quinces and grapes average Feed is very short in pastures. Rye and oats are generally average crops, though oats headed out low. There will be no rowen, and celery and cabbage cannot be set out until we have rain. Tomatoes are very late, the vines having made a very slow growth.

Winchester (Marshall Symmes).—The hay crop was heavier than last year and of good quality. Fodder corn is the principal forage crop grown and it is very badly dried up. Market-garden crops have suffered badly from drought and potatoes are not over half a crop. Apples and pears are very good on low lands; peaches are withering and falling off. Rye is a good crop and was harvested in fine condition. Early corn is so badly in need of rain that the ears do not grow at all except where irrigated.

ESSEX COUNTY.

Groveland (Abel Stockney).—Potato bugs are doing some damage. Indian corn is a little late but is generally fairly good; one-half the crop will go into the silo. The quality of the hay crop was No. 1 but the quantity was rather off. Oats, barley, corn, Hungarian grass and peas are the forage crops raised; acreage more than usual, but it has been very dry for the late sown. Those market-garden crops harvested have yielded fairly well, but it has been too dry for those not yet harvested. Apples, pears, peaches, plums and grapes promise well. Pastures are

short and dry. Rye oats and barley are average crops. Rain is much needed.

Newbury (G W. Adams). — Horn flies are doing some damage. Corn is backward but is otherwise in good condition; 15 per cent of the crop goes into the silo. Hay was a very light crop of good quality. Fodder corn and Hungarian grass are the principal forage crops grown; acreage about the same as usual as it has been too dry of late to warrant sowing. Market-garden crops make very fair yields, with prices fair. The prospect for a good yield of fruit is growing less with every day of drought. Pasturage is dried up. Rye, oats and barley were good crops, except on sandy land

North Andover (Peter Holt). — Potato bugs are doing some damage. Corn is looking well and nearly all of it will go into the silo. The quality of the hay crop was never better, but it was not over two-thirds of an average crop in quantity. Corn, oats, barley and Hungarian grass are raised for fodder. Everything in the shape of market-garden crops has suffered from drought. Apples are dropping and all fruit is badly affected by the drought.

Topsfield (B. P. Pike). — Indian corn is curling badly; 20 per cent of the crop will go into the silo. The hay crop was little heavier than last year. Corn, oats and Hungarian grass are the forage crops raised and they are not in good condition. Peas are a failure and it has been too dry for market-garden crops of all kinds. Apples will be a medium crop; pears and peaches will be a small crop. Pastures are in very poor condition. Rye, oats and barley are much below the average.

Hamilton (Alvin Smith). — Potato bugs and squash bugs are doing some damage. Indian corn is looking well and about one-third of the crop will be put into the silo. There will be a very light hay crop, but the quality will be good. Rye, oats, corn and barley are the forage crops raised; acreage somewhat increased and condition good. Market-garden crops generally failures; potatoes a light crop and prices medium. There is prospect of a fair quantity of fruit in this section. The condition of pasturage is the worst I have ever known. Rye, oats and barley are about average crops.

Danvers (C. H Preston). — The pea louse has done much damage. Indian corn is in fair condition on moist land. The hay crop was very small but of good quality. Barley, Hungarian grass, oats and corn are the principal forage crops grown; condition poor and more raised than usual. Market-garden crops are in poor condition on all except moist land. Apples, pears, peaches, grapes are good crops; no plums. Pasturage is in very poor condition.

NORFOLK COUNTY.

Cohasset (E E. Ellms). — The pea louse has ruined the late crop entirely throughout this section. Indian corn is in good condition. Hay was a good crop, both as to quantity and quality. Corn is the principal forage crop raised. Market-garden crops are not in good condition, owing to dry weather. The prospect for fruit of all kinds is very good. Pastures are very dry. Rye, oats and barley are about average crops.

Stoughton (C. F. Curtis). — Pea lice have done considerable damage. Indian corn must have rain as it is curling badly; nearly all the crop goes into the silo, The hay crop was 60 per cent of an average crop. Japanese millet and Hungarian grass are the principal forage crops; less sown than usual, owing to inability to get millet seed. Market-garden crops are suffering badly for want of rain. The prospect for fruit of all kinds is fair. Pastures on high land are burned up, on low lands good. Rye, oats and barley are rather less than average crops.

Canton (E. V. Kinsley). — Curculio and squash bugs are doing some damage. Corn looks well; few farmers have silos; perhaps 5 per cent of the crop is used for ensilage. Hay was below the average in quantity, quality of the best. Indian corn, sweet corn, Hungarian grass and rye are the forage crops grown; there is about the usual acreage and they are doing well. Potatoes look well; peas half a crop; prices high. Apples and pears full crops; other fruits good crops. Pastures are getting very dry. Winter rye very fine; oats a poor crop; barley good.

Millis (E. F. Richardson). — Potato bugs, white grubs and pea lice are doing some damage. Corn is in good condition and only a small proportion of the crop is used for silage. Hay was not quite an average crop, of good quality. Oats and peas, barley and Hungarian grass are the principal forage crops grown. Market-garden crops are in good condition; peas scarce and high; potatoes low. There will be a small crop of fruit and no cranberries. Pasturage is short and all dried up. Rye, oats and barley are good crops.

Franklin (C. M. Allen). — Crows and dry weather have injured Indian corn; a small per cent will go into the silo. The hay crop was light but of excellent quality. Millet and late barley are the principal forage crops grown, but the dry weather has delayed and damaged them. Early market-garden crops good; present crops and prospect poor. Apples good; pears fair; peaches light; plums and quinces few. Pasturage is all dried up. Rye, oats and barley are average crops.

Bellingham (J. J. O'Sullivan). — Pea lice and potato bugs are doing some damage. Indian corn needs rain; 10 per cent of the crop will go into the silo. Hay was 90 per cent of an average crop, of fair quality. Corn and oats are the principal forage crops grown, and are in fair condition, with about the usual acreage. Market-garden crops are in fair condition, but need rain; prices average. Apples will be a good crop and grapes fair. Pastures are drying up. Very little rye raised for grain; no oats or barley; average crops as forage crops.

BRISTOL COUNTY.

Norton (Wm. A. Lane). — Potato bugs and squash bugs are doing some damage. Indian corn is in fair condition and will be an average crop with rain; no silos here. The hay crop was about one-third larger than last year, and got in in good condition. Fodder corn is the principal forage crop raised. Potatoes are drying up fast and will have to get rain soon. There are some apples and a very few peaches; cranberries looking well. Rye, oats and barley are average crops.

Attleborough (Isaac Alger). — Potato bugs are doing some damage. Corn is now much in need of rain; no silos. Hay was about two-thirds of an average crop, of the very best quality. Millet, Hungarian grass and corn are the principal forage crops grown; all need rain; acreage somewhat increased. Apples have fallen badly, so there is only a small crop left on the trees. The potato crop will be very small unless rain comes soon. Pasturage is in fair condition. Rye, oats and barley are above average crops.

Raynham (N. W. Shaw). — Potato bugs are doing some damage. Indian corn is in good condition; none of the crop will go into the silo. The hay crop was off in quality, but of average quantity. Fodder corn is the principal forage crop grown. Yield of market-garden crops small; prices good, except for potatoes. The drought has destroyed pasturage. Rye, oats and barley are average crops.

Dartmouth (L. T. Davis). — Potato bugs and squash bugs are doing some damage. Indian corn is very backward and small; about three-fourths of the crop will go into the silo. Hay was about seven-eighths of a full crop, with quality never better. Corn, millet and barley are the forage crops grown. Market-garden crops are in poor condition; potatoes half dead; prices very low. Apples and pears three-fourths crops; peaches 25 per cent; quinces 60 per cent. Pasturage has about all dried up. Rye, oats and barley were not over half crops.

Acushnet (M. S. Douglas). — Canker worms and potato bugs are doing some damage. Indian corn is in poor condition and rolling badly on account of extreme drought; no silos. Hay was less than an average crop but of good quality. Millet and barley are the principal forage crops; they are growing very slowly, with about the usual acreage. Market-garden crops are in poor condition; potatoes half a crop; prices fairly good. Apples and pears are dropping badly; peaches and plums killed by frost; quinces, grapes and cranberries fairly good. Pastures are completely burned up. There will be a good crop of rye; oats fair.

Westport (A. S. Sherman). — Canker worms, plant lice and squash maggots are doing some damage. Corn is looking well; none for the silo. Hay was a light crop, of good quality. Corn, rye and oats are raised quite extensively as forage crops. The drought has injured market-garden crops very much, potatoes a small crop and prices low. Apples, pears and grapes will be plenty; peaches, plums and quinces scarce. There is no feed for cattle except in swamps. Rye and oats are good crops. Onions are looking well but need rain. Turnips are small and cannot grow until we have rain.

PLYMOUTH COUNTY.

Brockton (Davis Copeland). — Potato bugs and pea lice are doing some damage. Indian corn looks fairly well and 25 per cent of it will be put into the silo. Hay was about a three-fourths crop. Corn fodder is the principal forage crop grown. Market-garden crops are suffering for rain; yield and price of potatoes both a little off. Apples set well, as did grapes also. Pastures are getting very dry and short.

Bridgewater (R. Cass). — Potato bugs and squash bugs are doing

some damage. Corn is growing rapidly and is in good condition; no silos. The hay crop was below the average in quantity but of very good quality. Oats, Hungarian grass and fodder corn are the principal forage crops grown; condition very good and acreage increased about one-third. Potatoes show the effects of drought; prices of market-garden crops slightly above the average. Apples 60 per cent; pears 40 per cent; no peaches or plums; less than half a crop of quinces; grapes plentiful. Pastures are in poor condition. Rye, oats and barley are fair average crops.

Hanson (F. S. Thomas). — Indian corn is feeling the drought badly. Hay was above the average in both quantity and quality. Corn is the principal forage crop and is feeling the drought very badly on light soil; acreage about the same as usual. Market-garden crops are feeling the drought. The prospect is good for all kinds of fruit. Pasturage is feeling the drought now.

Duxbury (A. M. Goulding). — Corn has been looking finely but begins to show the effects of dry weather; not over one-third will go into the silo. The hay crop was 25 per cent heavier than last year and of No. 1 quality. Oats and peas, millet and corn are the principal forage crops grown; acreage about as usual and crops looking fairly well. Most of the early potatoes are practically ruined by drought. Apples fair; pears good; no peaches or plums; quinces medium; grapes and cranberries good. Pastures are short and rapidly drying up. Rye, oats and barley are full average crops.

Carver (J. A. Vaughan). — Potato bugs are very plenty. Corn needs rain as the leaves are rolling. An average crop of hay was secured in prime order. More millet and Hungarian grass have been sown than usual, but most of it has not yet come up. The yield of peas has been small, owing to the drought and pea lice; all crops need rain. There are but few apples, pears or plums and no peaches; cranberries promise an average crop. All highland pastures are dried up and cattle are being fed at the barns. Rye, oats and barley are average crops.

Lakeville (N. G. Staples). — Potato bugs are doing some damage. Indian corn is in fair condition and about 5 per cent of the crop will go into the silo. The hay crop was average in quantity and quality. Fodder corn and Hungarian grass are the principal forage crops grown. Market-garden crops are in bad condition, owing to drought; new potatoes sell for $1 per bushel. There will not be an average crop of fruit. Pasturage is all burned up. Rye, oats and barley look fairly well.

BARNSTABLE COUNTY.

Sandwich (J. R. Holway). — Indian corn is nearly all drying up; none put into the silo. Quantity of hay about the same as last year and quality good. Corn is the principal forage crop and less than usual has been planted, as it is too dry to plant now. Early potatoes and most garden crops are failures. There will be a fair crop of pears, peaches and grapes; not many apples and few cranberries. Pasturage is very short. Rye, oats and barley are short crops.

Falmouth (D. R. Wicks). — Potato bugs and squash bugs are doing

some damage. Corn is growing finely and stands the drought better than any other crop. Hay was half a crop, of the best quality. Corn and oats are the principal forage crops. Market-garden crops are very poor; potatoes a failure; prices average. Apples, peaches and plums dropping badly. Pastures look as brown as they would in winter. Rye, oats and barley are not much grown and are very short in stalk.

Mashpee (W. F. Hammond).— Potato bugs and cut worms are doing some damage. Indian corn is looking quite well, but will be a light crop on account of dry weather. Hay is half a crop, of fair quality. Oats and rye are the principal forage crops grown. All market-garden crops are below the average. Apples, pears, quinces, grapes and cranberries promise well. Pasturage is below the average in condition. Rye, oats and barley are about a failure.

Barnstable (John Bursley).— Marsh flies are annoying cattle. Indian corn is in fair condition; none for the silo. Hay was 75 per cent of an average crop in quantity and No 1 in quality. No forage crops sown, or if sown have failed to germinate because of extreme drought. There will be very light crops of all fruits except cranberries, which promise an average crop. Market-garden crops are a failure because of drought. Pastures are dried up and cows are fed at the barn. Rye was a fair crop and oats light.

Orleans (F. E. Snow).— Corn has been looking well but is curling badly now. The hay crop was short but of fairly good quality. Oats, Hungarian grass and millet are the forage crops grown. Potatoes are much injured by dry weather. Pears are looking well; apples not plentiful. Pasturage is very short. Rye, oats and barley are shortened by the dry weather.

Eastham (J. A. Clark).— Hay was a light crop, of good quality. Hungarian grass and Indian corn are the principal forage crops grown. Market-garden crops are all dried up. The fruit crop is affected by drought and will be small. Pasturage is dried up. We have been two months without rain of any amount.

DUKES COUNTY.

West Tisbury (Geo. Hunt Luce).— Potato bugs are doing some damage. Corn is beginning to curl up from drought; we have no silos. Hay was more than an average crop, of good quality. Some millet has been sown for forage, but the dry weather has about ruined it. Potatoes are small; market-garden crops much damaged by drought. The prospect for all kinds of fruit is poor. Pasturage is in poor condition. Oats are about a two-thirds crop.

NANTUCKET COUNTY.

Nantucket (C. W. Gardner).— Potato bugs and striped squash bugs are doing some damage. Drought has affected corn badly; no silos. Corn and millet are the principal forage crops. Potatoes half a crop; market-garden crops good. Pasturage is very dry. Hay was about a two-thirds crop, of very good quality.

BULLETIN OF

MASSACHUSETTS BOARD OF AGRICULTURE.

BIRDS AS PROTECTORS OF WOODLANDS.

By E. H. Forbush, *Ornithologist to the Board.*
Illustrated by the Author.

The greatest enemy of the forest is man himself, for there is no devastation of the woodlands which even approximates that which comes from fire or the axe. Against these evils (which are blessings only when well handled) only education and legislation can protect us. We know the injury to the woodlands caused by long droughts, or by cold and storms. From injuries so caused there is no deliverance, neither is there any remedy provided, but the damage from elemental causes usually falls on trees which have passed their age of greatest usefulness, or upon young and sickly specimens. We know that trees are subject to many injuries by animals. Their foliage is eaten by beetles, flies, grubs and caterpillars; their fruit and seeds destroyed by insects, birds and squirrels; their twigs destroyed by borers or cut off by girdlers; their bark eaten by mice, hares and other animals; their trunks and roots attacked by wood borers; and even their very life blood, the sap, is sucked out by aphids. Against such injuries, however, nature provides preventatives or remedies. Some species of trees have hundreds of species of insects feeding upon them. When we consider well the fecundity, voracity and the consequent great possibilities for mischief possessed by the trees' enemies we wonder that trees survive at all. Still, trees spring up and grow apace. In a wooded country a few years' neglect of field or pasture suffices to clothe it with a growth of bushes and young trees, and in time a wood lot succeeds the cleared land. That trees are able thus to spring up and grow to maturity without man's care is sufficient evidence that they are protected by their natural friends from the too injurious inroads of their natural enemies.

Among these friends birds hold the chief place. It is generally believed that there are few birds in deep woods. Travellers have often remarked the scarcity of birds in the forest, and it is true that usually there are fewer birds, both in numbers of species and individuals, in most northern forests than in more open or cultivated lands. Those that live and breed in the deep woods, however, are especially fitted to destroy the trees' enemies, and twice each year, in spring and fall, a great wave of migratory, insect-eating birds, that summer in the north and winter near the tropics, passes through the woods of the temperate zone, gleaning insects from the trees as well as from the plants springing from forest floor, from the leaf mold or from out the very ground.

Here in Massachusetts, in the chill days of March and early April, when sunshine and shadow fleck the lingering snow, in silent woods and

along the swollen streams the lusty fox sparrow searches for hibernating insects, which only await the warmer sun of April or May to emerge from their hiding places and lay their eggs upon or attack the trees. He and his companions, the tree sparrow and the junco, soon pass on to the north, making way for the white-throats and thrushes, which continue the good work, to be followed in their turn by other thrushes and towhees. In early April birds are not plentiful in the woods, but the chickadees, woodpeckers, jays, nuthatches and kinglets are doing their part. Later, in the warm days of May, when nature has awakened from her long winter's sleep, when the little, light green oak leaves are just opening, when the bright young birch leaves decorate but do not hide the twigs, when every leaflet vies with the flowers in beauty and every branch upholds its grateful offering, when insects which were dormant or sluggish during the earlier days of the year become active in ascending the trees, and when their swarming offspring appear on bud and leaf, then the south wind brings the migratory host of birds which winter near the equator. They sweep through the woods, they encompass the trees, flight after flight passes along on its way to the north, all gleaning insects as they go. No one who has not watched these birds hour after hour and day after day, who has not listened to their multitudinous notes as night after night they have passed overhead, can realize the numbers that sweep through the woods in the spring and fall migrations. Those who have watched the flights of wood warblers during the present season cannot but marvel at their vast and constantly changing procession. On May 11 of the present year at Amesbury, Mass., Blackburnian warblers were seen all through the woods at daybreak. Having come in the previous night they were not singing but were busily feeding until seven o'clock. At eight o'clock not one was to be seen. They had passed on, and other species had taken their place.

The great body of migratory warblers feeds largely on caterpillars and plant lice, — two of the worst enemies of trees. They come at a time when the first broods of these creatures appear, and so do yeoman service in preventing their enormous increase. One needs only to know the possibilities in the way of reproduction among the plant lice to appreciate the services of birds in destroying these early broods. Lintner says of one species, — the hop-vine aphis, — that according to Riley it has thirteen generations a year, and that, giving the average number of young produced by each female as 100, if every individual should attain maturity and produce its full complement of young, the twelfth brood alone would amount to ten sextillions. If this brood, says Lintner, were marshalled in line, ten to the inch, touching one another, the procession would extend to the sun (a space travelled by light in eight minutes), and beyond that to the nearest fixed star (a distance travelled by light in six years), and onward into space beyond the most distant star that the strongest telescope may bring to our view, to a point so inconceivably remote that light would only reach us from it in twenty-five hundred years. It need hardly be said that no such multiplication as this can ever occur in nature, still the calculation shows the possibilities of great danger to vegetation should any of the forces be withdrawn which hold these insects in check. Dr. Fitch, by a careful enumeration and computation, estimated that several young cherry trees about ten feet in height were each infested by at least twelve millions of aphids.*

The increase of these creatures is largely controlled by birds, but in greenhouses, where birds cannot go, plant lice are a serious evil, and florists have to combat them with insecticides and fumigation. The value of birds as aphis eaters has been shown by confining birds in greenhouses. E. A. Samuels says that three full-grown rose bushes in

* American Journal Agricultural Science, 1846, page 282.

a greenhouse were infested by some two thousand plant lice, which were all consumed in a few hours by a single titmouse. Rudolphus Bingham of Camden, N. J., states that he kept a winter garden almost entirely free from plant lice, wasps and flies by confining an indigo bird there. He also kept a few native sparrows in a large greenhouse, and as a result the place suffered very little from insect attacks. After the birds had been introduced he found it unnecessary to fumigate. These experiments determine only that birds will eat aphids when confined with them, but any one who will watch the warblers and other small birds in May among the birch or other woods infested by aphids will be convinced that they take vast numbers from choice. My assistant, Mr. F. H. Mosher, watched a pair of Maryland yellow-throats eating plant lice from the birches in the Middlesex Fells reservation in Malden, May 28, 1898. One of them ate 89 of these tiny insects in one minute and they continued eating at that rate for forty minutes. Mr. Mosher states that they must have eaten considerably over 7,000 in that time. This seems hardly credible, but Mr. Mosher is a very careful, painstaking and trustworthy witness. He adds that the birds made several other visits to the tree during the forenoon and continued feeding as at first.

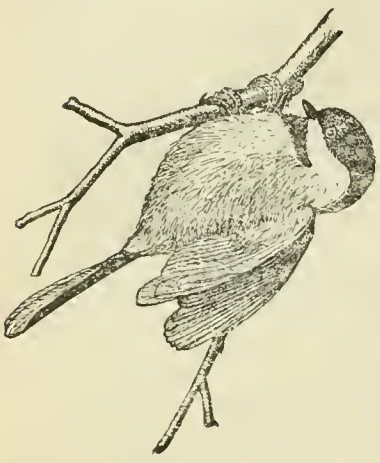

Fig. 1. — Chickadee hunting insects.

The larvæ of the *Lepidoptera*, commonly called caterpillars, are among the worst enemies of trees, and where they are numerous they form at least two-thirds of the food of the warblers. Probably all woodland birds, from hawks, crows and owls down to the tiny titmice, wrens and kinglets, feed on smooth-skinned caterpillars, while at least fifty species are now known to feed on the spiny and hairy caterpillars. It is largely due to a lack of native birds that the shade trees in our cities are so overrun with caterpillars. While the imported sparrow keeps down the spanworms it does not check many other pests. When the imported leopard moth appeared in New York and Brooklyn, causing great havoc among the trees in the parks, it was feared that as the insect spread it would become a serious enemy to the trees of the entire country. But I am informed by Dr. J. B. Smith, State entomologist of New Jersey, that this moth is doing little damage in the country districts, where the native birds seem to keep it in check. At first it looked as if the large larvæ would escape the birds because of their habits. They are borers, beginning life within the small twigs, and when these quarters get too narrow for them they eat holes out and crawl down outside to larger twigs. It is then they are taken by many native birds, though the imported sparrows do not appear to check them. Dr. Smith says that the woodpeckers eat the female moths and probably drag the young larvæ out of the smaller twigs. The American silkworm, the larvæ of *Telea polyphemus*, is one of the largest and most voracious of our caterpillars, and should it increase as rapidly as the gypsy moth it would become a fearful pest, but it is noticeable that this and other allied species of great size never reach a destructive height. The principal reason for their scarcity is that they are eagerly eaten by birds. Hawks, owls, goatsuckers, woodpeckers, jays, robins, tanagers, blackbirds and other species capture these large caterpillars. When Mr. Leopold Tronvelot was engaged in raising American silkworms at Medford the robins came from all quarters to destroy them, and gave him more trouble than all other birds combined.

Mr. Trouvelot says that one of these caterpillars will consume in fifty-

six days not less than one hundred and twenty oak leaves, weighing three-fourths of a pound, drinking in the mean time not less than one-half ounce of water, the weight of the food eaten being eighty-six thousand times the weight of the worm on the first day. During this time it has increased in weight four thousand one hundred and forty times. The destructiveness of the species if allowed to increase may be imagined. Two thousand of these insects were taken by the birds from a small oak in front of his door within a few days. Mr. Trouvelot, speaking of the birds which penetrated into the enclosure in which he was raising the silkworms, quaintly says: "The small ones could go through the meshes and the larger ones through some holes in the old net. So I was obliged to chase them all the day long, as when pursuing them on one side they would fly to the other and quietly feed, until I again reappeared." He expresses the belief that in a state of nature ninety-five per cent. of these insects are destroyed by birds alone.

But this is only one indication of the value of birds in this respect. When settlers first began to plant orchards and establish tree claims on the western prairies there were few, if any, arboreal birds, except along the timbered river bottoms. The settlers imported insect pests on young trees. The enemies of tree insects being absent, because the country was destitute of well-grown groves and orchards, the insects increased and over-ran the seedling trees, — the larger moths, like the cecropia and the polyphemus, being the worst pests of all, increasing rapidly, eating voraciously and making it almost impossible to raise trees. Dr. Lawrence Bruner, in a paper on insects injurious to tree claims, states that the absence alone of so great a factor as these birds in keeping down and ridding a country of its insect pests soon becomes apparent in the great increase and consequent damage done by these pests. He asserts, also, that as an enemy to tree culture the cecropia has no equal in some portions of the prairie country, and that its large caterpillars often defoliate entire groves, something unheard of here. Mr. W. C. Colt, who has had experience in raising trees in Dakota, tells me that the caterpillars of this and other large species were terribly destructive there. As groves and orchards became established, however, and arboreal birds spread over the country, these caterpillars were reduced by them to a state of comparative harmlessness.

During the past two summers, 1898 and 1899, much injury has been done to the woods in certain sections of New England by the so-called forest tent caterpillar (*Clisiocampa disstria*). Birds destroy great numbers of these pests, and were birds more numerous there would probably be no great outbreaks such as have occurred in recent years. Dr. E. P. Felt, State entomologist of New York, says that one of the most fruitful methods of keeping this pest in check through its natural enemies will probably be found in encouraging and protecting the native birds known to feed upon it.*

As showing the large numbers of these caterpillars eaten by birds a few notes from Mr. Mosher's observations will be of interest. A black-billed cuckoo was seen to eat 36 forest tent caterpillars within five minutes. Red-eyed vireos (probably a pair) took 92 forest tent caterpillars from a tree within an hour. They were also eating span worms and other larvæ and plant lice. A male Baltimore oriole went into a tree infested by these caterpillars, where he stayed four minutes, killing 18 caterpillars in that time; coming a little later he stayed seven minutes and took 26 caterpillars. A pair of blue jays came to the tree twenty-four times during three hours, taking 2 or 3 caterpillars at each visit.

All through the summer the trees are guarded by the birds. While the white grubs of the May beetle are still in the ground, ere they can emerge to feed on the foliage, the robins, crows, thrushes and blackbirds

* Insects injurious to maple trees, 4th annual report, Commissioners Fisheries, Game and Forests.

search them out and destroy them. The sparrows and towhees also search among the dead leaves for caterpillars which crawl on the ground and drop from the trees, and for those which pupate among the litter of the forest floor. Woodpeckers tapping the trunks bring forth injurious ants, bark beetles, wood-boring insects. Creepers, kinglets and nuthatches search the bark and cavities of the trunk and limbs for scale insects, bark lice, borers, bark beetles and the larvæ and pupæ of insects which hide there. Warblers, thrushes, tanagers, wrens, titmice, vireos, cuckoos and other tree-loving birds pry about among the leaves and branches in search of caterpillars of all sorts. Even the hidden leaf rollers are sought out by the grosbeaks and many other birds and the gall insects are dragged from their hiding places by the jays and grosbeaks. Titmice get the bud worms and woodpeckers search out the worm which destroys the fruit. When the span worms, disturbed by the movements of the caterpillar-hunting warblers, vireos and sparrows among leaves and twigs, spin down on their gossamer threads, and so escape one enemy, they are marked by flycatchers sitting on the watch or hovering in the air ready to dart upon them. When the mature insects, gaining wings, attempt to escape by flight, they are snapped up by these same flycatchers, which sit waiting on the outer limbs of the trees, or, escaping these, they are pursued by the swallows and swifts in the upper air. Those whose flight is nocturnal must run the gauntlet of the screech owl, night-hawk and whippoorwill. Thus birds guard the trees as the summer wanes, until the chill of autumn evenings causes the remaining insects to seek winter hiding-places and warns the birds to begin their southward migrations. Then the tide of bird life turns back, and, passing, leaves the wood in silence, except for the sighing of the branches and the rustle of the falling leaves. In October a few thrushes flit here and there, blue jays mournfully call, a crow caws now and then, but otherwise the woods seem deserted. Still at this season of the year and all through the winter and early spring months the few birds which remain are accomplishing the greatest good for the forest; for now the development and increase of all insects is arrested while their destruction by birds goes on. Another point, the winter birds must subsist largely on the hibernating eggs of insects, for many insects pass the winter in that form alone, and the bird that eats these eggs can destroy a hundred times as many insects in this minute, embryonic form, as it could in the summer after the caterpillars had hatched and grown toward maturity. Again, the jays, titmice, nuthatches and woodpeckers, which remain through the winter in the northern woods, must give at least six months more of service to the trees in Massachusetts than the majority of birds that come here as migrants, or as summer residents only. These birds, with the creepers and kinglets, are especially the guardians of the wood. Millions upon millions of insects and their eggs are destroyed by them during the long winter months. In this work they are assisted to some extent by the winter finches and sparrows.

The following notes from the pen of my friend and co-worker, Mr. A. H. Kirkland, are of especial interest, from their accurate description of the manner in which eggs of plant lice are destroyed by winter birds.

Bird Notes.

"*Birds* v. *aphid eggs.* — Many of our common aphids winter in the egg stage, these eggs being attached to the buds or stalks of the food plants. The large aphid common on willows lays oblong black eggs on the sides of the buds late in the fall. On Jan. 25, 1898, at the Arnold Arboretum, Jamaica Plain, I saw a flock of about half a dozen chickadees feeding on the eggs of this aphid. Some of the birds while feeding came within ten or fifteen feet of the place where I was standing, and I could observe plainly their movements.

"The aphid common to the white birch in this region lays great masses of eggs on the buds and twigs. Some trees during the fall of 1897 were so thoroughly covered with these eggs that the natural color of the bark was obscured. This vast quantity of eggs served as a storehouse of food for many of our winter birds, and during the days when the ground was covered with snow several species of seed-eating birds were seen to feed upon them. Throughout the winter the chickadees fed on these eggs. The fact was one of almost daily observation. On March 10, 1898, while on a tramp through the Middlesex Fells, I noticed a large flock of these birds feeding in the white birches that covered the southern exposure of a hill. By entering the brushland in advance of the birds I was soon in the midst of the flock, and, remaining motionless, had an opportunity to observe them feeding upon the masses of the eggs. A few days before this date I saw a downy woodpecker feeding upon the eggs on a large white birch that was partly covered with them. Goldfinches were also common visitors to the infested bushes, especially after the snowstorms. The stomach of one of these birds taken at 8 A.M., Feb. 3, 1898, contained 2,210 eggs of the white birch aphid. When other food was scarce the English sparrow found these eggs a suitable article of diet, and one of these birds, taken at 4 P.M., Jan. 29, 1898, contained 1,478 aphid eggs.

"A plant louse that is common on larches, often to an injurious extent, is *Chermes larcifolia*, Fitch. This insect lays great numbers of stalked eggs in April and May, and the young lice resulting feed on the juices of the leaves throughout the summer. At the Bell Rock Cemetery, Malden, April 20, 1898, I saw a flock of over forty goldfinches feeding on the eggs and female lice. The birds began feeding at the top of the trees, worked down to the lower branches, then flew to the top of the next larch and repeated the performance. A few English sparrows also ate the eggs.

"During the past winter (1897-98) I have frequently seen chickadees feeding upon female canker worm moths, picking them to pieces before eating them. On Nov. 26, 1897, I examined the stomach of a white-breasted nuthatch and found it to contain 1,629 eggs of the fall canker worm. There were no moth remains in the stomach, and it is evident that the bird gathered these eggs from the trees."

FIG 2. — Downy woodpecker and his excavations.

My friend, Mr. C. E. Bailey, writes that on March 28, 1899, a single downy woodpecker made 26 excavations for food between 9.40 A.M and 12.15 P.M During this time it climbed over and inspected, in a greater or less degree, 181 trees. Most of these excavations exposed galleries in the trunks or high branches in which ants were hibernating. An examination of the stomach of this bird brought to light one spider, 1 beetle (unidentified), 2 larvæ of bark beetles (*Scolytidæ*) and 22 ants, also partially digested material which could not be identified. At 12.15 the woodpecker was at work thirty-five feet from the ground on the dead end of a broken branch, in which were the channels or galleries

of large black ants. The bird had made four openings into these galleries and in each case had uncovered hibernating black ants. By what sense these motionless insects were discovered in their hidden burrows will perhaps always remain a mystery.

On March 30 a brown creeper was seen to inspect 43 trees in an hour, getting its food from crevices in the bark.

Another downy woodpecker was seen on March 31, 1899, taking the larvæ of beetles from beneath the bark of oak trees. The bird seemed to know the exact spot to drill for each larva, for it always cut a small hole directly over the insect, finding the prey unerringly.

The cut, Fig. 3, gives view of the outer surface of a section of bark taken from a small oak. From this small piece of bark the bird probably secured at least six of the larvæ that were found in its stomach. The holes *a*, *b*, *c*, *d*, *e*, *f* indicate those from which the larvæ were taken.

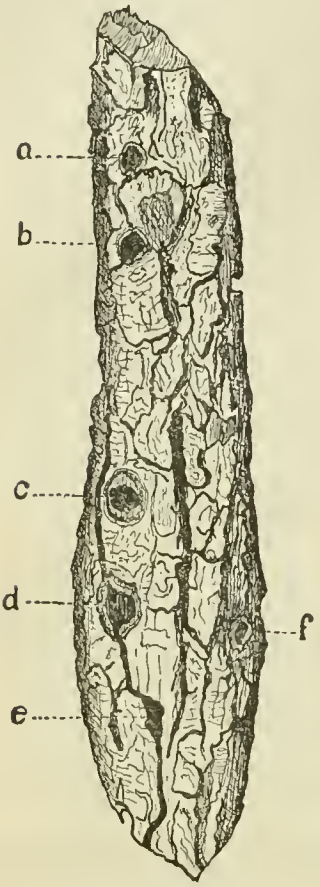

Fig. 3. — Oak bark pierced by downy woodpecker.

Fig. 4 gives a view of the inner surface of the same piece of bark, showing how true was the stroke of the bird, for its beak, piercing from the outside, went directly to the centre of the burrow where the insect lay entirely hidden from view. The letters *a*, *b*, *c*, *d*, *e*, *f* indicate the holes, showing size and shape, where the bird's beak came through to the inner surface. Seventeen larvæ of bark beetles and 12 ants were found in the bird's stomach.

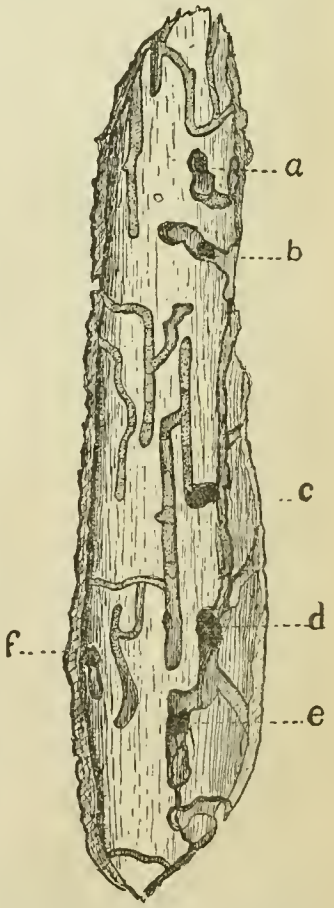

Fig. 4. — Inner surface of the same bark, showing the channels of bark beetles and the woodpecker's perforations.

During the winter the chickadees and jays perform priceless service by destroying quantities of the eggs of such insects as those of the tent caterpillar and canker worm moths. The owls and some of the hawks are useful, not alone in the summer, when they destroy many of the May beetles, larger caterpillars and moths, and keep down the increase of the mice and squirrels, but those that stay through the winter are also useful then by keeping squirrels, mice and hares in check. Hares and mice sometimes do great damage by gnawing the bark or roots of trees. All of these animals become injurious whenever abnormally numerous. Witness the great plagues of field mice in Norway, and the injury caused in our western plains by the prairie hare or so-called jack-rabbit.

And so, day by day, throughout the year, birds work for the good of the forest. In satisfying their own appetites and providing for their young they guard and protect the trees, which in turn provide them with food and shelter. In satisfying their appetites on the fruit and seed

they distribute and sow the seed which shall provide food for future generations of birds. It is thus, throughout, nature's great plan that one organism depends on others, each upon each throughout their numberless inter-relations, and he is a wise man who can interfere with nature's plan, and, by introducing new forces, or destroying some of the old, change the scheme without producing disastrous results. Yet we have gone on blindly, destroying our native birds. Gunners shoot them right and left; feather hunters slaughter them; boys with air rifles and shotguns decimate them; a million worthless cats are turned loose to prey upon them; their eggs and young are destroyed at sight by children, cats and dogs; if in pay for their valuable services they take a little fruit or grain the farmer, who should be their best friend, turns upon them and adds to the slaughter. As a result of all this and more many species of birds are now rare which were formerly abundant. A few are nearly extinct, and some of the larger species have disappeared from the State. Let birds be encouraged and protected from their enemies and they will reoccupy their former haunts, and there will then be less necessity for the use of Paris green and other insecticides.

Native Birds useful in Woods.

For the information of those interested in the subject lists of birds known to destroy some of the worst enemies of trees are given below. The canker worms are reckoned here as among the forest pests, as they frequently attack elms and other trees in the woods, as well as in fields and along roadsides. The tent caterpillar is also included, as it is in some seasons very plentiful in the woods, where it attacks first the wild cherry and afterward the birch, and occasionally other trees. The gypsy moth is placed first in order, as it is an imported insect and is considered the most injurious of all. As the Commonwealth of Massachusetts, which has expended more than a million dollars in an attempt to exterminate this insect, has now given up the task as impracticable, and as it is now probably only a question of time before the insect will spread over the country, all birds which may assist in holding it in check assume the utmost importance. The next insect, the brown-tail moth, another importation from Europe, bids fair also to become here, as in Europe, a pest of the first class. While this insect does not feed on so many trees and other plants as the gypsy moth, it has already proved itself a serious nuisance here, destructive to fruit, shade, orchard and forest trees. The State legislature having neglected to provide for the extinction of this insect when it first appeared, it is rapidly spreading, and is now known to have obtained a foothold in Maine and New Hampshire. Tent caterpillars, both the canker worms, the tussock moth, and the white grub or May beetle, are all well known and destructive native pests, while plant lice are probably known among farmers, gardeners and foresters everywhere. The methods pursued in gaining the information given in the lists below have been described in the crop report for September, 1899.* This work has been supplemented by stomach examinations.

Birds feeding on the Gypsy Moth (Porthetria dispar, Linn.).

The list of birds given in 1896 in the report on the gypsy moth enumerated only 38 species, while 46 are included in the list given below. Several of those not included in the earlier list have been found since to be habitual feeders on this insect. Among these are the scarlet tanager and the Nashville and golden-winged warblers. There is little doubt that this insect as it becomes disseminated will be attacked by other

* Birds as destroyers of hairy caterpillars, annual report, Massachusetts State Board of Agriculture, 1899, page 316.

birds, and it is believed that several species not given in the list are now attacking it, but, in view of the general belief that birds do not eat hairy caterpillars, care has been taken to secure the most positive proof before inserting the name of any bird in the list. The list is larger than that given of birds attacking any other of the hairy caterpillars, but more attention has been paid to the enemies of this pest. No doubt as many species of birds may be found attacking other hairy caterpillars.

Yellow-billed cuckoo,
Black-billed cuckoo,
Hairy woodpecker,
Downy woodpecker,
Yellow-bellied sapsucker,
Flicker,
Kingbird,
Great-crested flycatcher,
Phœbe,
Wood pewee,
Least flycatcher,
Blue jay,
Crow,
Red-winged blackbird,
Baltimore oriole,
Bronzed grackle or crow blackbird,
Chipping sparrow,
Song sparrow,
Towhee,
Red-breasted grosbeak,
Indigo bunting,
English sparrow,
Scarlet tanager,
Red-eyed vireo,
Yellow-throated vireo,
White-eyed vireo,
Black-and-white warbler,
Golden-winged warbler,
Nashville warbler,
Parula warbler,
Yellow warbler,
Chestnut-sided warbler,
Maryland yellow-throat,
Black-throated green warbler,
Oven-bird,
American redstart,
Catbird,
Brown thrasher,
House wren,
White-breasted nuthatch,
Red-breasted nuthatch,
Chickadee,
Wood thrush,
Wlson's thrush,
Amirican robin,
Bluebird.

Birds feeding on the Brown-tail Moth Caterpillar (Euproctis Chrysorrhœa, Linn.).

So far only 29 species of birds have been observed to attack the brown-tail moth. All of these it is believed eat the caterpillars, but the flycatchers attack mainly the flying moths. Birds appear at times to reduce the initial colonies of these pests to harmless numbers. The English sparrow occasionally eats a few caterpillars or imagoes, but appears to spend more than an equal amount of time in driving more useful birds away from the infested trees.

Yellow-billed cuckoo,
Black-billed cuckoo,
Kingbird,
Great-creasted flycatcher,
Least flycatcher,
Blue jay,
Crow,
Red-winged blackbird,
Baltimore oriole,
Bronzed grackle or crow blackbird,
Chipping sparrow,
Field sparrow,
Song sparrow,
Rose-breasted grosbeak,
Indigo bunting,
English sparrow,
Scarlet tanager,
Red-eyed vireo,
Yellow-throated vireo,
Warbling vireo,
Golden-winged warbler,
Nashville warbler,
Yellow warbler,
Chestnut-sided warbler,
American redstart,
Catbird,
Chickadee,
Wood thrush,
American robin.

Birds feeding on the Forest Tent Caterpillar (Clisiocampa disstria, Hubn.).

Twenty-five species of birds are now known to attack this insect. In connection with a list of birds given by Dr. Felt as feeding on this caterpillar he quotes Miss Caroline G. Soule of Brookline to the effect that nuthatches become so absorbed in feeding on masses of these caterpillars that they would allow her to approach and touch them. In our experience, however, the nuthatches seemed not particularly fond of these larvæ, but this only illustrates how individuals of the same species acquire different tastes. Our observations have often shown that one individual of a species may reject as food that which another of the same species will devour with avidity. All of the species given except the English sparrow, feed on the caterpillars. This sparrow, however, catches some of the flying moths. These are no doubt eaten by many birds not in this list.

Yellow-billed cuckoo,
Black-billed cuckoo,
Yellow-bellied sapsucker,
Flicker,
Blue jay,
Crow,
Baltimore oriole,
Bronzed grackle or crow blackbird,
Chipping sparrow,
Towhee,
English sparrow,
Scarlet tanager,
Red-eyed vireo,
Warbling vireo,
White-eyed vireo,
Black-and-white warbler,
Golden-winged warbler,
Yellow warbler,
American redstart,
Catbird,
White-breasted nuthatch,
Chickadee,
Wood thrush,
American robin,
Cedar waxwing.

Birds feeding on the Tent Caterpillar (Clisiocampa americana, Harr.).

We have found by observation and stomach examination that at least 32 species eat the tent caterpillar. Others not on the list probably eat the mature insect and the pupa is taken from its cocoon and eaten by several. The tent or web seems to be some protection to the caterpillars within it, as few birds have been observed to break open the web and take out the caterpillars. Most birds appear to prefer the caterpillars from the twigs and branches. The crow, blue jay, Baltimore oriole and red-eyed vireo are among those that tear open the web and haul the caterpillars forth.

Yellow-billed cuckoo,
Black-billed cuckoo,
Hairy woodpecker,
Downy woodpecker,
Flicker,
Whippoorwill,
Chimney swift,
Wood pewee,
Blue jay,
Crow,
Red-winged blackbird,
Baltimore oriole,
Bronzed grackle or crow blackbird,
White-throated sparrow,
Chipping sparrow,
Field sparrow,
Towhee,
Rose-breasted grosbeak,
Scarlet tanager,
Red-eyed vireo,
Yellow-throated vireo,
Black-and-white warbler,
Golden-winged warbler,
Nashville warbler,
Parula warbler,
Black-throated blue warbler,
American redstart,
Catbird,
Brown thrasher,
House wren,
Chickadee,
American robin.

Birds which feed on the Canker Worms.

This list of birds which feed on canker worms embraces most of the families and genera of the smaller land birds which were well represented in the locality and at the time when the observations were made. It is probable that whenever small, smooth-skinned caterpillars become numerous, they are attacked by most species of small land birds in the vicinity, as such caterpillars are everywhere eaten greedily by most of the smaller birds and also used as food for their young.

Yellow-billed cuckoo,
Black-billed cuckoo,
Hairy woodpecker,
Downy woodpecker,
Yellow-bellied sapsucker,
Flicker,
Whippoorwill,
Kingbird,
Crested flycatcher,
Phœbe,
Olive-sided flycatcher,
Wood pewee,
Least flycatcher,
Blue jay,
Crow,
Bobolink,
Red-winged blackbird,
Baltimore oriole,
Bronzed grackle or crow blackbird,
American goldfinch,
Chipping sparrow,
Field sparrow,
Song sparrow,
Towhee,
American robin,
Rose-breasted grosbeak,
Indigo bunting,
English sparrow,
Scarlet tanager,
Red-eyed vireo,
Yellow-throated vireo,
Warbling vireo,
White-eyed vireo,
Black-and-white warbler,
Golden-winged warbler,
Nashville warbler,
Parula warbler,
Yellow warbler,
Magnolia warbler,
Chestnut-sided warbler,
Maryland yellow-throat,
Black-throated green warbler,
American redstart,
Catbird,
Brown thrasher,
House wren,
White-breasted nuthatch,
Chickadee,
Wood thrush,
Bluebird,
Cedar waxwing.

Birds feeding on the White-marked Tussock Moth (Orgyia leucostigma).

Probably all the birds which feed upon the other hairy caterpillars feed also upon this, but as the opportunity for observation on this species has been limited the list is given for what it is worth. This species has become very destructive to city shade trees since the introduction of the English sparrow, which, eating few of these insects itself, has driven out the native birds which formerly fed upon the caterpillars. It is interesting to note that of late in some parts of eastern Massachusetts at least the sparrow is not so obnoxious as during the years immediately succeeding its introduction and increase, and that a few of the native birds are returning to their old breeding place. This may result in checking the ravages of the tussock moth, which does little damage to orchards, shade trees or woodlands where sparrows are scarce and native birds plenty.

Yellow-billed cuckoo,
Black-billed cuckoo,
Whippoorwill,
Chimney swift,
Phœbe,
Blue jay,
Baltimore oriole,
Robin,
English sparrow.

Birds feeding on the May Beetle or its Larva, the White Grub (Genus Lachnosterna).

As the white grubs live in the ground they probably are not eaten by many birds except such as, like the robin and blackbird, follow the plough. It is this grub that eats the grass roots in lawns and fields, thereby destroying the turf, sometimes in great patches. Crows, robins and blackbirds know where to find these larvæ and how to unearth them. The mature insect, or May beetle, feeds on the foliage of the trees and flies in the night. It is then captured on the wing by owls and whip-poorwills. Hawks also find them occasionally and the omnivorous crows and jays destroy many more.

Flicker,
Blue jay,
Crow,
Sparrow hawk,
Kingbird,
Red-winged blackbird,
Bronzed grackle or crow blackbird,
Robin.

Birds feeding on Plant Lice (Aphidæ).

Most of the following birds feed largely on the aphids which infest the gray birch and other forest trees. Most warblers and the indigo bird are particularly active in this respect. The chickadee and the redstart are also among the most useful species. The swifts and smaller flycatchers catch many of the flying imagoes. No doubt this is also true of the swallows, although we have not yet observed swallows feeding on these insects. Probably most of the smaller birds feed upon aphids when they are plentiful, but it is not likely that the larger species often seek out such minute insects. The woodpeckers, which eat ants, especially the flicker and downy woodpecker, also eat aphids.

Downy woodpecker,
Flicker,
Chimney swift,
Ruby-throated humming bird,
Wood pewee,
Least flycatcher,
Purple finch,
Red-winged blackbird,
Baltimore oriole,
American goldfinch,
Chipping sparrow,
Field sparrow,
Bobolink,
Towhee,
Rose-breasted grosbeak,
Indigo bunting,
Chickadee,
Scarlet tanager,
Red-eyed vireo,
Yellow-throated vireo,
Black-and-white warbler,
Myrtle warbler,
Parula warbler,
Yellow warbler,
Black-throated blue warbler,
Magnolia warbler,
Chestnut-sided warbler,
Maryland yellow-throat,
Black-throated green warbler,
Oven bird,
American redstart,
Catbird,
White-breasted nuthatch,
American robin.

A glance over the list of birds given above as feeding on the different species of caterpillars will show that some of the birds which are believed by many people to be harmful occur in all these lists. The crow eats many caterpillars and more pupæ. The despised jay, which certainly may do much harm by destroying the eggs and young of smaller birds, is one of the most valuable birds we have in some respects, being a most persistent hunter of the caterpillars, chrysalids and eggs of some of the most injurious moths. The oriole, which has a taste for fruit, is a gourmand for caterpillars, and the robin and catbird, much decried by

fruit growers, feed on nearly all species of injurious caterpillars of the orchard or woodland. The cuckoos are always and everywhere present with the caterpillars, and by many are believed to head the list of caterpillar destroyers, but in woodlands there are no birds more useful in this respect than the beautiful scarlet tanagers or the busy chickadees. Of all the warblers the redstart seems to be the most indefatigable in pursuit of caterpillars, capturing even the most repugnant species. The list of birds feeding on the different species are not believed to be complete by any means. Most of them probably attack with less avidity the hairy and spiny species, the smaller birds taking them mainly when the caterpillars are small and the larger birds when they grow larger.

Injury done by Birds to Woodlands.

There can be no doubt that some slight injury may be done to the trees by birds. The grosbeaks and the purple finches eat buds and blossoms; grouse feed largely on young buds; crows and jays eat nuts; crossbills take the seed and buds from coniferous trees; and woodpeckers sometimes bore into sound trees, but the injury done is so slight compared with the benefits conferred by birds in protecting trees from their enemies, and in distributing and planting seeds, that it need hardly be considered in making up the account. It is now said in favor of the much-abused sapsucker that it is the perforations of its beak which produce much of the appearance called "birdseye" in the maple, which greatly increases the value of this tree for timber use. Forest birds appear to have been especially designed to maintain that balance of forces in the forest which is essential to its preservation, and we may well fear that without their assistance profitable forestry would be impossible. In this matter there is no higher authority than the distinguished entomologist, Prof. S. A. Forbes of Illinois, who says that estimates of the average number of insects per square yard in that State give ten thousand per acre for the entire area, and that if on this basis the operations of birds were to be suspended entirely the entire State in seven years would be carpeted with insects one to the square inch. This would certainly happen unless the insects were checked by some providential means. Professor Forbes says that this is intended only as an illustration and not as a prediction of the consequences of the total destruction of birds, which he says would not be so simple, but apparently fully as grave. He also estimates that should the people of the State succeed in taking measures which would increase by so much as one per cent the efficiency of the birds of the State as insect police, the effect would be to save to the agriculturists of the State seventy-six thousand dollars per year, but he regards five times this amount as a very modest estimate, for he says the figures on which his estimates are made "will be regarded by most naturalists as absurdly low."

How to increase the Number of Birds useful in Woodlands.

Some practical lessons have been learned from the study of the food of the wood birds. As birds go where they find food most abundant many birds of the swamp, field and orchard go from their usual haunts, one-half mile or more, to the woods to feed on insects plentiful there. Thus the bobolink in the meadow goes to the woods for aphids, and the oriole in the orchard and the blackbird in the marsh go there for caterpillars. On the other hand, the chickadee, blue jay, tanager and the warblers go from the woods to the orchards and gardens for caterpillars. In an orchard near the woods we noticed that the wood birds came frequently to those trees nearest the woods, and by adding their work to that of those living in the orchard soon cleared the canker worms from the trees nearest the woods.

All our experience thus far goes to show that a well-watered country, where the woodland is kept mainly in detached patches, with the rest of the land more open, much of it well cultivated, with an occasional marsh or swamp, is the best calculated to encourage the increase of the largest numbers of species of birds. In such a country vegetation should therefore receive better protection from birds than in any other. In view of these facts it is possible for a man owning from thirty to one hundred acres of land to so select his land and control the growth of vegetation upon it as to obtain the conditions requisite to secure an abundance and variety of birds. The first requisite to attract birds is an abundance of suitable food. To provide this a variety of vegetation is desirable. This provides not only a variety of fruit and seeds, but furnishes food for a large variety of insects, which will attract the birds. It is especially desirable to have both wild and cultivated cherries and grapes, and if the birds take too large a proportion of the cultivated species, the earlier wild berries, like the Russian mulberry, and the shadberry, should be planted to draw the birds' attention from the cultivated fruit. Winter food may be furnished birds by planting mountain ash, sumach, bayberry and other berries which cling to the trees or shrubs bearing them during the winter months. The winter birds may be induced to remain in some numbers by hanging bones, suet or portions of any carcass in sheltered places on the trees. These will furnish food for them when the trees are covered with ice, and will keep them in the neighborhood during the coldest weather. Sunflower seeds, broken nuts and grain will sometimes attract winter birds.

Having secured food the birds must have shelter from the elements and their enemies. This may be provided by planting thick evergreen trees in groups and allowing a deciduous thicket here and there. Nesting boxes should be provided for those birds which will use them and such boxes will shelter many a bird from winter storms. Nesting material, such as straw, feathers, waste string, etc., should be hung upon limbs during the nesting season. It will soon be utilized. Having made a locality attractive to birds they must be protected and fostered. Birds soon learn to love a place where they receive a measure of protection from their enemies. We may protect them : —

1. By doing away with cats, so far as possible.
2. By stopping promiscuous gunning.
3. By suppressing birds-egging boys.
4. By keeping hawks, crows and jays within bounds.

It is well not only to have a variety of trees in your woodland, but also to have portions of it in different stages of growth. A small patch of ground covered with young sprouts furnishes a desirable breeding place for such birds as the indigo bird, brown thrasher, towhee and several warblers, all of which may be very useful in adjoining woodland. If each farm, wooded or otherwise, could be ideally situated and cultivated, with the protection and accommodation of birds always in view, it is doubtful if Paris green and other insecticides would find a ready market in this Commonwealth, except, perhaps, in such cases as that of the gypsy moth, where man disturbs the balance of nature by introducing a new pest from a foreign shore.

SERIES OF 1900. BULLETIN NO. 4.

MASSACHUSETTS

CROP REPORT

FOR THE

MONTH OF AUGUST, 1900.

ISSUED BY

J. W. STOCKWELL,

SECRETARY STATE BOARD OF AGRICULTURE.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 POST OFFICE SQUARE.
1900.

Crop Report for the Month of August, 1900.

Office of State Board of Agriculture,
Boston, Mass., Sept. 1, 1900.

Bulletin No. 4, Crop Report for the month of August, is herewith presented. Particular attention is called to the article on "Poultry keeping on the farm," by Arthur A. Brigham, Ph.D., director Rhode Island Agricultural Experiment Station.

Progress of the Season.

The August report of the Statistician of the United States Department of Agriculture states that the average condition of corn is 87.5, being 2.4 points lower than on the corresponding date last year, but .5 point higher than on Aug. 1, 1898, and 1.3 points above the mean of the August averages for the last ten years.

The average condition of spring wheat was 56.4, an improvement of 1.2 points during July, but 27.2 points lower than last year, 40.1 lower than on Aug. 1, 1898, and 27.8 points below the mean of the August averages for the last ten years.

The average condition of oats was 85, a loss of .5 point during July, and 5.8 points lower than last year at the same date, but .8 point higher than on Aug. 1, 1898, and 2.7 points above the mean of the August averages for the last ten years.

The average condition of barley was 71.6, a decline of 4.7 points during July, 22 points lower than last year, 7.7 points lower than on Aug. 1, 1898, and 13.7 points below the mean of the August averages for the last ten years.

The average condition of spring rye improved 6.3 points during July, to 76, but was 13 points lower than last year, 17.7 points lower than on Aug. 1, 1898, and 10.9 points below the mean of the August averages for the last ten years.

Preliminary returns indicate a decrease of 32,000 acres, or 4.8 per cent, in the acreage of buckwheat, as compared with last year. The average condition, 87.9, was 5.3 points lower than last year and 2.9 points below the mean of the August averages for the last ten years.

The average condition of potatoes, 88.2, shows a decline of 3.1 points during July, and was 4.8 points lower than last year, but 4.3 points higher than on Aug. 1, 1898, and 2.2 points above the mean of the August averages for the last ten years.

Of the 13 principal sweet-potato-producing States, 5 report an improvement during July and 6 a decline, the condition remaining unchanged in the other two States.

Preliminary returns indicate a reduction of 5.3 per cent in the hay acreage. The condition of timothy hay, 79.9, is 6.8 points lower than at the corresponding date last year, 19.4 points lower than on Aug. 1, 1898, and 7.5 points below the mean of the August averages for the last nine years.

During July the changes in the condition of the tobacco crop were almost wholly unfavorable.

The condition of sugar cane in Louisiana is within 3 points of the normal, is 22 points higher than on August 1 last year, and 5 points above the ten-year average. Other States report like favorable conditions. The condition of sorghum is in the main favorable.

The condition of rice is very high.

While there has been a slight decline in the condition of apples, there is not an important apple-producing State in which the condition on August 1 did not exceed the ten-year average. The indications still point to a phenomenally large crop.

There has been a marked improvement in the condition of pastures, and in not a few States the condition is now considerably above the ten-year average.

In Massachusetts the average condition of corn was 92; average condition of spring rye, 89; average condition of oats, 96; average condition of barley, 89; acreage of buckwheat as compared with last year, 99, and average condition 93; average condition of tobacco, 98; average condition of potatoes, 79; acreage of hay, as compared with last year,

96; average condition of timothy, 77; production of clover as compared with last year 71, and average condition 78; average condition of pasture, 75; average condition of apples, 84.

Temperature and Rainfall for the Whole Country.

[From the United States Climate and Crop Bulletins.]

Week ending July 30. — The week averaged slightly warmer than usual in New England, at a few stations on the South Atlantic coast and over the northern districts from Minnesota westward to the North Pacific coast. Throughout the central and southern portions of the country the week was not as warm as usual. The week was cool throughout the central valleys, middle Rocky Mountain slope and west Gulf States. The rainfall of the week, though generally in excess of the average, was very unevenly distributed. A large part of the Gulf and South Atlantic States, central valleys, Lake region and New England received heavy rains; elsewhere the rainfall was generally less than usual.

Week ending August 6. — The week was exceptionally warm in the Missouri and central and upper Mississippi valleys, and was warmer than usual on the immediate California coast, Lake region, Ohio valley and east Gulf States. Over the western portion of the plateau region, Texas and the Middle Atlantic States and New England the temperature averaged below normal. Generally throughout the central valleys, Lake region, New England, Middle Atlantic States and the northern portion of the Gulf States the week was marked by a lack of rainfall. There were very heavy rains on the west gulf coast and in local areas elsewhere.

Week ending August 13. — The week was excessively warm throughout the central valleys, Lake region and the Atlantic coast districts northward of Florida. The week was decidedly cool for the season in the Rocky Mountain regions and over most of the Pacific coast districts. There was more than the usual amount of rainfall in the west Gulf States, from the upper Lake region westward to the north Pacific coast and over portions of the central Missouri and

lower Ohio valleys. In southern New England, the Middle, South Atlantic and east Gulf States the week was drier than usual.

Week ending August 20. — The week, while not quite so hot as the one immediately preceding, was intensely warm in the central and northern portions of the country east of the Rocky Mountains, excepting New England. In the west Gulf States nearly normal temperatures prevailed, and on the northern New England coast it averaged slightly below normal. From eastern Nebraska over Iowa, Illinois, Indiana, Ohio, West Virginia and New England abundant rains fell during the week. Over the greater portion of the Gulf States and in the Middle Atlantic States, as well as over a large part of the Lake region, the rainfall was below the average.

Week ending August 27. — The week was the fourth week of excessive heat in the districts lying east of the Rocky Mountains. The maximum temperature records for the last decade of August were equalled or exceeded at many stations in the central valleys and on the Atlantic coast. In New England moderate temperatures prevailed the first half of the week, but the latter part was very warm. In the Missouri and Red River of the North valleys, over the greater part of the upper Mississippi valley, the southern portions of the Lake region and in the Middle Atlantic States there were very heavy rains. Elsewhere the rainfall was generally less than usual.

Special Telegraphic Reports.

[Weather Bureau, Boston.]

Week ending July 30. — New England. Boston: General heavy rains greatly benefited crops; corn promises average yield; rye harvested, crop medium; early potatoes a failure, late improving; blackberries and blueberries less promising; raspberries poor; tobacco topping continues, large crop expected; heavy growth of rowen.

Week ending August 6. — New England. Boston: Cool and excessively dry; corn doing well; potatoes making little growth; much oats mowed for fodder; raspberries

and blackberries abundant in northern section; dairying interests suffering because of drought.

Week ending August 13. — New England. Boston: Heavy rains in northern portion and moderate in southern; very warm; wheat and oats ripening in northern portion, both heavy; corn continues favorable; late potatoes promising; grapes abundant; apples continue to promise average crop, early varieties plentiful.

Week ending August 20. — New England. Boston: Heavy rains, cool weather; corn making satisfactory growth; pastures improved; some potatoes blighting, otherwise promising; tobacco cutting commenced, superior crop; apples medium yield, improving, not so many falling; grapes plentiful.

Week ending August 27. — New England. Boston: Little rain; great extremes in temperature; good for harvesting oats, barley, hungarian grass and tobacco; corn still promising; pastures poor; apples improving, summer and fall varieties plentiful, winter average; late potatoes still growing; beans medium; onions small.

The Weather of August, 1900.

The month opened with a "spell" of clear weather and cool nights, which continued through the 5th. In favorable localities the temperature fell dangerously near the frost point. The cool wave broke the record for August for many years past, variously estimated from ten to twenty-five years. This was followed by a period of warm weather with a high per cent of moisture. The mercury ranged in the 90's in all sections except those of the immediate coast. There were frequent showers from the 6th to the 10th, with the rainfall generally in light to moderate amounts. Three days of generally fair and cooler weather followed, with much easterly wind, and fogs were prevalent in coast sections. The third week of the month was characterized by much cloudiness and rain. The storm of the 15th was quite general, giving copious rainfalls in nearly all parts of the State. During no week of the present season has there been so much precipitation. Comparatively low temperature accompanied the foul weather. The weather for the

remainder of the month was generally fair, the exceptions consisting of local storms, usually attended by thunder and light rainfall. During this portion of the month great extremes in temperature were experienced. From the 20th to the 23d a moderate cool wave prevailed, and this was followed by several of the warmest days of the season. The highest temperatures of the season were recorded from the 25th to the 27th, when the figures ranged from 90° to 110°. Excepting the high temperature, the fair weather was ideal for the harvesting of mature crops. The precipitation during the month was generally sufficient to maintain growing conditions, but the moisture was chiefly near the surface, below which the earth was very dry to a considerable depth. The weather of August, as a whole, did not depart greatly from the average for this month.

In the circular to correspondents, returnable August 24, the following questions were asked: —

1. What is the condition of Indian corn?
2. What is the prospect for rowen as compared with a normal crop?
3. What is the prospect for late potatoes, and have you noticed blight or rot?
4. How do the acreage and condition of tobacco compare with the normal?
5. What is the prospect for apples, pears, peaches, grapes and cranberries?
6. What is the condition of pasturage in your vicinity?
7. How have oats and barley compared with former years?
8. Do your farmers pay much attention to poultry, and what proportion does the income derived from poultry products bear to that derived from dairy products?

Returns were received from 140 correspondents, from which the following summary has been made: —

Indian Corn.

Indian corn is perhaps somewhat late in most sections, but promises a good crop in all except Middlesex, Essex and Barnstable counties, where the returns indicate that

there will be less than an average crop, owing to the severe drought of the earlier part of the season. Elsewhere a good growth is generally reported, and also that it is well set with ears.

Rowen.

The rowen crop will be light in all sections, and in some instances nearly or quite a failure. Only 17 correspondents speak of it as "good," "average" or "fair." The drought of July injured most mowing fields, and rain is yet needed to put them in good condition for next year.

Late Potatoes.

Late potatoes suffered from the drought, and the crop as a whole will be below the average in all sections. There is some complaint that the tubers are small, also that they are few in the hill. Blight has appeared, more or less, in all sections, but cannot be called general, and very little rot is reported.

Tobacco.

A slight general increase in the acreage of tobacco is reported from nearly all towns in the tobacco region. The crop is generally in excellent condition, with a large, fine leaf, which promises to be of good quality. Cutting was well under way at the time of making returns, and is now practically completed.

Fruit.

Apples fell off in condition during the month, but a good crop is generally promised, and in many cases it will be much above the average. Pears will give a fair crop. Peaches are much below the normal, but fully up to the average of years. Grapes generally promise well. Cranberries will be a light crop, particularly in the region of commercial production.

Pasturage.

The rains of the second decade of August helped pastures materially, but they are still generally far from being in good condition, and cattle are being fed at the barns in many sec-

tions. Frequent rains are needed if they are to carry out well as to fall feed, and also to put them in good condition for next year.

Oats and Barley.

Both these crops have been below the average as to both grain and straw. Barley is but little raised for grain. As late-planted forage crops they are generally doing well.

Poultry Keeping.

No particularly new facts were elicited by the inquiry as to poultry keeping, but our conclusions of previous years, viz., that poultry keeping is generally on the increase; that the most attention is paid to it in the south-eastern counties, where the income derived from it is fully equal to that from the dairy; that even without special care poultry keeping is a profitable branch of farming, and that with proper attention it must be one of the most profitable — were again confirmed. Attention is again called to the article at the end of this bulletin, on "Poultry keeping on the farm," which must prove helpful to any one interested in poultry raising, and particularly to those just starting in the industry.

NOTES OF CORRESPONDENTS.

(Returned to us August 24.)

BERKSHIRE COUNTY.

Sheffield (Dwight Andrews). — Indian corn looks to be a fair crop. Rowen is not up to the average. The prospect for late potatoes is good, though there is some blight. Tobacco promises to be a full average crop. Apples will give an average yield. Oats have been a short crop. Pastures are now very dry. Poultry raising is quite an industry, and the income derived from it averages fully up to that from the dairy.

Otis (S. H. Norton). — Corn is looking well but is rather late. Rowen will be a light crop. Potatoes are looking well; no rot as yet. Apples and pears will give full average crops. Pastures are in fair condition. Oats are a full average crop. Poultry raising is on the increase, and some farmers say that it pays better than dairying.

Alford (L. T. Osborne). — Indian corn is much above the average in condition and promises a large yield. The prospect is for a very light crop of rowen, about 60 per cent of the normal. Late potatoes will be nearly an average crop. Apples are above a normal crop and pears are an average one. Pasturage is below the average in condition. Oats and barley are a little above the average. Farmers are paying more attention each year to poultry keeping. The income derived from it is perhaps one-eighth of that derived from the dairy, and we think the income from fifty hens will equal that from one cow.

Stockbridge (F. A. Palmer). — Corn is a little late, but is doing very nicely. Rowen will not be over 70 per cent of a full crop. Late potatoes are a light crop, but no blight or rot has appeared as yet. Apples and pears are good crops; no peaches. Pasturage is only in fair condition, having suffered from drought. Oats and barley are up to par. Very little is done in poultry with us.

Richmond (T. B. Salmon). — Indian corn is very late, owing to dry weather. Rowen will be less than an average crop. Late potatoes will be about a two-thirds crop; blight has appeared, but there is no rot as yet. The prospect for apples and pears is good; very few peaches and grapes. Pasturage is short. Oats and

barley are not up to average crops. Our farmers pay considerable attention to poultry, and the income derived from it is about one-sixth that from the dairy. Buckwheat looks well.

Windsor (W. H. Tirrell). — Indian corn is in good condition. Rowen will be a poor crop. There is prospect of a good crop of late potatoes, and no blight or rot has appeared as yet. The prospect is good for all kinds of fruit. Oats and barley compare well with former years. We give poultry but little attention.

Savoy (W. W. Burnett). — Indian corn is a week or ten days late, but has a good growth and is looking finely. Rowen is much less than an average crop. A light yield of late potatoes is anticipated, as they have been struck with blight. There will be an average crop of fruit. Pasturage is in fair condition, the late rains having brightened pastures finely. Oats and barley are about average crops, and are mostly cut green for fodder. Nearly all do something with poultry, and the income derived from it is perhaps one-fifth or one-fourth that from the dairy.

New Ashford (Elihu Ingraham). — Corn is in good condition. The prospect for rowen is poor. Late potatoes will not be more than half a crop, though there is no blight as yet. Apples promise to give a fair crop. Pastures are in fair condition. Oats were a fine crop; no barley raised. The income derived from poultry keeping is about one-eighth that from the dairy.

FRANKLIN COUNTY.

Leyden (U. T. Darling). — Indian corn is in very good shape, but a little backward. Rowen will be very much less than an average crop. The potato crop, both early and late, will be exceedingly light. Apples, pears and grapes will give good crops; no peaches or cranberries. Pastures are in very good condition, considering the little rain we have had. Oats and barley are about average crops. Not much attention is given to poultry raising, and the income from it is small compared to that from dairy products.

Gill (F. F. Stoughton). — Corn is in extra good condition. Rowen will be rather a light crop, but is growing very fast now. Potatoes have not been dug yet, and there is some blight. The prospect for apples and grapes is good. Some pastures have been rather short the last few weeks. Oats have been an extra good crop. There is considerable poultry kept. Cucumbers and vines generally have not done well.

Conway (J. C. Newhall). — Indian corn has made a fine growth of late, and is looking very well now. The rowen crop is the lightest for years, although it is growing some now. Potatoes are

a poor crop; blight and dry weather are the causes. The acreage of tobacco is increased, and a splendid-looking crop is now being harvested. Fruits are full average crops. Owing to the severe drought, pastures are short, although they are looking green now. Oats and barley are not much raised, but were about average crops. Not much is done in the poultry line.

Deerfield (Chas. Jones). — Indian corn is more than an average crop. Rowen is a short crop, but is growing well now. Late potatoes are below the average, with some blight. Tobacco is being harvested, and is a very good crop. Pasturage is short, but is improving. Oats are an average crop. Apples are not up to the average, but grapes are above it. Very little attention is paid to poultry and much to the dairy.

Whately (Frank Dickinson). — Corn is in good condition. Rowen will give a very light crop. Some fields of late potatoes are good, others poor; no rot. The acreage of tobacco is increased, and there is a fine crop. Apples are a full crop, as are also grapes; there will be some peaches and pears. Oats are a good crop. Pastures are dry, but are growing some just now. Very little attention is paid to poultry.

Northfield (T. R. Callendar). — Indian corn is about up to the average, though on some dry fields it shows the effect of drought. Very little rowen will be secured. Late potatoes look well, and there is little blight or rot. Apples promise a large yield. There is a good crop of tobacco, the leaf being large and free from imperfections. Pastures are reviving under the frequent rains, and are up to the average for the time of year. Oats and barley are fair crops, though little grown except for hay. Very little attention is paid to poultry, and the income from it is less than one-tenth that from the dairy. Cucumbers grown for pickling are a short crop, the vines dying unusually early.

Sunderland (J. M. J. Legate). — Corn is a little late, but promises to be a very heavy crop. Rowen is about an average crop. The potato crop will be below the average in this vicinity; some blight, but no rot as yet. There is a larger acreage of tobacco than common, and the crop is heavy and of good quality. Pasturage is in fine condition, owing to the late rains. There will be a light crop of apples, owing to the drought, but grapes are looking finely. Very little attention is paid to poultry, and I think that our farmers as a general thing would be unable to state the income they receive from this source.

New Salem (Daniel Ballard). — Indian corn is looking well, and promises more than an average yield. Rowen is somewhat less than a normal crop in this vicinity. There is apparently a

fair average yield of late potatoes, with but little blight or rot as yet. Apples are a large crop on the hills, not so plenty in the valleys; pears and grapes plenty; but few peaches. Pasturage is rather short, though recent rains have revived it somewhat. There has been a good average yield of oats and barley. A good deal of attention is paid to poultry in this vicinity. When well cared for they are quite profitable, — more so than the dairy.

HAMPSHIRE COUNTY.

Greenwich (Wm. S. Douglas). — Indian corn promises a fair crop. Rowen promises a fair crop. There is some complaint of blight on late potatoes. The crop of all kinds of fruits will be light. Pasturage is in average condition.

Belchertown (H. C. West). — Indian corn is a few days late, otherwise the best crop in years. The rowen crop is below the average, yet is more than was expected two weeks ago. Late potatoes promise a fair crop; no blight or rot as yet. Tobacco is far above the normal in both acreage and condition, the most promising crop in years. Apples are from one-half to a two-thirds crop, as are also pears; peaches and grapes are above average crops. Pastures are short, but green; cattle looking fairly well. Oats and barley are full average crops. There are comparatively few poultry farmers, but those few claim a much better net income than from dairying.

Hadley (L. W. West). — Indian corn is ten per cent above the normal in condition. Rowen is about a three-fourths crop. Late potatoes are few in the hill; considerable blight, no rot. The acreage of tobacco is increased 5 per cent, and it is 10 per cent above the normal in condition. Apples, pears and peaches good; grapes first rate. Pasturage is below normal in condition. Oats are about a normal crop. Many give attention to poultry, with the income about one-fourth that from the dairy. I think I never saw a better crop of tobacco.

Granby (Geo. A. Blish). — Corn is a little late, but is growing very fast. Rowen is a light crop on most fields. There is a general complaint of a light crop of potatoes, with some blight. There is a fair crop of apples, but not much other fruit. Pastures have started a little in the past two weeks, but are still short. There is an average crop of oats and barley, mostly used for green feed. Not much attention is given to poultry.

Southampton (C. B. Lyman). — Indian corn promises to be a good crop. The rowen crop is the lightest for years. Late potatoes will be a light crop, with no rot as yet. There is the usual acreage of tobacco, and it is fully up to the average in condition.

Apples are hardly an average crop, though good in some localities. Pastures are looking brown and bare. Oats were a good crop. Not much attention is paid to poultry, and the income from it is small.

Huntington (H. W. Stickney). — Indian corn is in very good condition. Rowen is not a very good crop. The prospect is good for late potatoes, and no blight has appeared. There is but one piece of tobacco raised in town. Apples are very good; very few peaches; grapes looking finely. In most of the pastures there is very little feed. Oats and barley are about normal crops. Our farmers do not pay much attention to poultry.

HAMPDEN COUNTY.

Tolland (E. M. Moore). — Corn is in good condition, and will be an average crop. Rowen will be about a two-thirds crop, owing to drought. Late potatoes are looking well, and I have not noticed any blight or rot. Apples have dropped badly, but the prospect is for a good crop of grapes and cranberries. Pastures are dried up and feed is short. Oats and barley are above average crops. Not much attention is paid to poultry by farmers in this locality.

Russell (E. D. Parks). — Corn is looking well, with plenty of ears, and bids fair to be an average crop. The continued dry weather has injured rowen very much, and it will be a very light crop. Potatoes are small, and not over half a crop is expected; no rot or blight reported. Apples are a good crop; other fruits about average. Pastures are very dry. Oats and barley are below average crops. Considerable attention is paid to poultry raising, and the income from poultry products is one-fourth that from the dairy.

Southwick (L. A. Fowler). — Indian corn is in good condition. Owing to the dry weather after haying, the rowen crop will be light. The prospect for late potatoes has improved since the late rains. There is an increased acreage of tobacco, and the condition is a little above the normal. There is about half a crop of apples, pears and grapes; few peaches and cranberries. The August rains have improved pasturage. Oats and barley were good crops. A few of our farmers pay considerable attention to poultry, but the income derived is small in comparison with that from the dairy.

West Springfield (J. N. Bagg). — Indian corn is generally in good condition. Rowen will not be half a crop. Late potatoes will probably be a light crop; some pieces show blight. The acreage of tobacco is increased, and it is 100 in condition. Apples and pears abundant; peaches scarce; grapes light. Pasturage is light and thin. Some attention is paid to poultry, and the income

from it is perhaps one-fourth that from the dairy. Market gardening is increasing, and so is dairying.

Chicopee (R. W. Bemis). — Corn is a remarkably good crop where properly cared for. Rowen is considerably less than a normal crop. Late potatoes are less than an average crop, but there is not much blight or rot. Tobacco is considerably above the normal. There is a fair prospect for a good crop of pears, peaches and grapes, but it has been too dry for apples. Pastures have been very dry. Oats and barley have been good crops, taking the drought into consideration. Some pay considerable attention to poultry, others do not; the amount of income depends on the ability of the farmer and the attention given.

Ludlow (C. B. Bennett). — Indian corn is in very good condition. Rowen will give about half a crop. Late potatoes look well, but have commenced to blight. Very few apples and pears and no peaches, but a large crop of grapes. Pasturage is poor, but is improving. Oats and barley are average crops. Very little attention is paid to poultry. Ensilage corn looks uncommonly well, and some have begun to fill their silos.

East Longmeadow (J. L. Davis). — Corn is in need of rain to carry out the ears set. Rowen is not over 25 per cent of a full crop. Late potatoes have blighted on half the fields, and not over half a crop is expected. Apples and peaches light crops; pears plenty. Pasturage is short and our farmers want to sell their stock. Oats have been a light crop. There is more poultry kept this year than last; should say the income from poultry was about one-tenth that from the dairy.

Wales (C. F. Crawford). — Corn is looking very well. Hay was cut late, which spoils the rowen crop. Potatoes promise a light yield, but there is no rot or blight. Apples are an average crop; other fruits not plenty. Pastures are good for the time of year. Oats and barley are good crops. Poultry is of little importance, compared to the dairy, with us.

WORCESTER COUNTY.

Warren (W. E. Patrick). — Indian corn is in fine condition, but is a little backward. Rowen will be about two-thirds of a normal crop, and will be cut late. There is a fair prospect for late potatoes; very little blight and no rot. There is a large crop of apples, pears and grapes; also a good crop of peaches. Pasturage has improved with recent rains, and is now about average for the time of year. Oats are not quite up to the average, and are mostly hayed. Not much attention is paid to poultry by our farmers.

Brookfield (F. E. Prouty). — Corn is in good condition. In this immediate vicinity the rowen crop is quite good. Have seen no blight or rot on late potatoes; tubers large, but not many in the hill. Apples a good crop; pears light; grapes good; cranberries killed by high water. Pasturage is in excellent condition. Oats and barley are good crops. There is quite a little attention given to the raising of poultry, and I think it increases every year, but could not say just how it would compare with the dairy.

West Brookfield (L. H. Chamberlain). — Corn is very promising. Rowen promises to be a good crop. The prospect is good for late potatoes, although there is some blight. The prospect is good for apples, pears and grapes; no peaches or cranberries. Pastures are in full average condition. Oats and barley were good crops, but were all cut for fodder. Very little attention is paid to poultry by our farmers, but we have a few hen men in town.

Oakham (Jesse Allen). — Indian corn is in excellent condition. Rowen is nearly an entire failure. Late potatoes will be a light crop, and have blasted slightly. Apples are abundant; pears, peaches and grapes light crops. Pastures are very short, but improved by recent rains. Oats and barley are more than average crops. Considerable attention is paid to poultry, and the income derived from it is probably one-tenth that from the dairy.

Dana (E. A. Albee). — Corn is a fine crop. There will not be over one-fourth of an average crop of rowen. Late potatoes still look green, without blight or rot. Apples will be one-fourth of an average crop; pears average; grapes good; no cranberries. The dry weather makes the pastures very short. Oats are a good crop; no barley raised of any account. Most of our farmers make more from poultry than from the dairy.

Royalston (C. A. Stimson). — Indian corn is a good crop. Rowen is very poor, not over a one-third crop. Late potatoes will be light; blight has appeared, but no rot as yet. Apples, pears, peaches, grapes and cranberries are good crops. Drought has injured pastures, and stock are fed at barns. Oats and barley are about three-fourths crops. Not much attention is paid to poultry, but the income from it is probably one-fourth that from the dairy.

Gardner (A. F. Johnson). — Indian corn promises to be a fine crop. Rowen will be a light crop. Late potatoes look well, and I think will be better than the early ones. There are many apples, but they are mostly rather small. Pasturage is in poor condition. Oats and barley have been average crops. Not much attention is paid to poultry, but it is increasing each year; the income derived from it is probably about one per cent that from the dairy.

Westminster (G. A. Stockwell). — Corn is not as good a crop as last year. There will be a fair crop of rowen. Late potatoes will give a good crop; have noticed neither blight nor rot. There will be a large crop of all kinds of fruit except peaches. Pasturage is very dry. Oats and barley are about average crops. Much attention is paid to poultry, and the income derived from it about equal to that from the dairy.

Harvard (J. S. Preston). — Indian corn is looking very well, but is not filled out as well as usual. Practically speaking, there is no rowen. Late potatoes are almost a failure. Apples and pears are large crops; peaches, grapes and cranberries fair. Pastures are looking better than last month, but are still short. Oats and barley are less than average crops. Some of our farmers do quite a poultry business.

Bolton (H. F. Haynes). — Dry weather injured Indian corn, but it is doing well now. Rowen is a poor crop. Late potatoes are not more than 40 per cent of an average crop; some blight, but no rot. Apples are a good crop; pears half a crop, as are also peaches and grapes. Pasturage is short, but is gaining since the rains. Oats and barley are good crops, but were all cut green. But few do much with poultry, but all who do think that it pays better than dairying.

Northborough (J. K. Mills). — Corn is looking well, with the exception of pieces planted on very dry ground. Rowen will be about 75 per cent of a good crop. Late potatoes promise to be quite good; some blight, but no rot. There will be a large crop of apples; prospect for peaches, pears and grapes good. Pastures have improved with the rain, but milch cows have to be fed at the barn. Oats and barley are about average crops. I should say that the income derived from poultry was about one-tenth that from the dairy.

Worcester (S. A. Burgess). — Indian corn is in good condition. Rowen will be a light crop. The prospect for late potatoes is good, and there is no blight or rot. The prospect is good for all kinds of fruit. Pasturage is now in pretty good condition. Oats and barley were fair crops. Some small farmers do quite well with poultry, and about 5 per cent of the income of our farmers may come from that source. Late rains have helped all crops.

Oxford (D. M. Howe). — Corn is in good condition. Very little rowen will be cut. Late potatoes will be very good; early ones did not seem to ripen very well, and are small. Apples will be a large crop; pears a good crop; peaches few; grapes plenty and cranberries few. Pasturage is very short. Oats and barley are good crops.

Sutton (C. P. King). — Indian corn is growing finely, and promises a large crop. The rowen crop is about normal. Late potatoes are doing well. Apples and pears are a heavy crop; peaches are rotting badly. Pasturage is in good condition. Oats are a heavy crop; barley normal. Nearly all farmers keep large flocks of poultry, but dairy products greatly exceed poultry products in value.

Blackstone (O. F. Fuller). — Indian corn is in good condition. Rowen will be less than an average crop. I have heard no complaints as to blight or rot on potatoes. Apples good; few peaches, pears and grapes. Pastures are very short. Farmers pay a great deal of attention to poultry here, and there are a number of very large poultry keepers in town.

MIDDLESEX COUNTY.

Hopkinton (W. V. Thompson). — Corn is in good condition. There is practically no rowen. Potatoes, early and late, are a failure, with scab and blight. Pears and apples fair crops; peaches few; grapes a full crop. Pastures are dry. Oats and barley are average crops. Considerable attention is paid to poultry, and the income from it is nearly equal to that from the dairy.

Marlborough (E. D. Howe). — Indian corn is a normal crop. Rowen is about a three-fourths crop, and recent rains have helped it. The prospect for late potatoes is good, though there is quite a little blight. Apples, 100; pears, 75; peaches, 60; and grapes, 75. Pasturage is improving, but is still quite short. Oats and barley are about average crops. Out of fifty farmers hereabouts some five make a specialty of poultry, and this represents very nearly the proportion of income from dairy and poultry.

Ashby (A. Wetherbee). — Corn is injured somewhat by drought. Rowen will not amount to much. Late potatoes will be a fair crop; some blight and rot. Apples, pears and grapes are good crops, and there will be a few peaches. Pasturage is very short. Oats and barley are a little below the average. There is some poultry kept, but it is not increasing.

Westford (J. W. Fletcher). — Indian corn is in good condition. Late rains have improved the prospect for the rowen crop, and a good crop is now looked for. Not many late potatoes are raised. There will be more apples than we can dispose of; peaches plenty. Pasturage is in very good condition. Oats and barley are about average crops. Not much attention is paid to poultry.

Carlisle (E. J. Carr). — Corn is below the average in condition, and very late. Rowen will be a very small crop. Late po-

tatoes will give a small crop, and there is no blight or rot. Full crop of apples; small crop of pears and peaches; plenty of grapes; no cranberries. Pasturage is in better condition than a month ago, but below the average. Oats and barley are about average crops. Only a few farmers pay much attention to poultry, and they don't half pay attention. The income is four times as great for the capital invested as that from the dairy.

Concord (Wm. H. Hunt). — Corn suffered from drought on light land, but is now doing well. There will be a small crop of rowen. Have seen no rot yet on late potatoes; crop not over three-fourths of the normal. A fair crop of apples and pears; some grapes and peaches. Pastures are in very poor condition. Oats and barley are light crops. There is an increase in the poultry business in this vicinity, but the income derived from poultry is very small compared with that from the dairy.

Wakefield (C. P. Talbot). — Indian corn suffered greatly from drought, and is not more than half the usual crop. Late potatoes are looking finely, and there is no rot or blight. Apples, pears and grapes are abundant; cranberries few; peaches none. Pastures have been in very poor condition, but the rains have helped them much. Oats and barley were not over 70 per cent of full crops. On farms where poultry are taken care of they pay better than cows, and the income from poultry is fully as large as that from the dairy.

Stoneham (J. E. Wiley). — There is no Indian corn raised in town. Rowen will be less than half a crop. Late potatoes are a very poor crop. Apples good, pears fair, grapes good. Pastures have been very poor, but have improved some since the late rains. Our farmers do not pay much attention to poultry, and there are no dairy products to speak of.

Winchester (Marshall Symmes). — There is no Indian corn raised. Rowen will not be quite an average crop. Potatoes are all rather small; no blight as yet. Apples, pears and peaches will be good crops. Pasturage is just beginning to recover from the long drought. Very little is done with poultry.

Weston (H. L. Brown). — Corn is looking well. On low, moist land there will be a good crop of rowen. There is a prospect of about half a crop of late potatoes; no blight as yet. All fruits are good except cranberries. Pasturage is short. Only such farmers as make it their principal business pay much attention to poultry.

Newton (Otis Pettee). — Most fields of Indian corn are looking well, though a few show the effects of drought. Unless we have early and copious rains, the rowen crop will be light. I have

noticed a little blight on late potatoes, but not much. Apple and pear trees are well loaded with fruit. Pasturage is rather light, though recent showers have helped it in a measure.

ESSEX COUNTY.

Salisbury (Wesley Pettengill). — On high ground Indian corn was injured by the drought; on medium and low ground it is looking well. There is very little rowen worth mowing. There will be a light yield of late potatoes; have noticed no rot. Apples a large crop; pears fair; peaches fair; grapes good; cranberries light. Pasturage has been uncommonly poor all summer, but has improved some since the rains. Oats and barley were about three-fourths crops. Some farmers keep five or six hundred hens, and the average income from poultry is nearly one-half that from the dairy. The farmers along the sea coast will have a large crop of salt hay this year, which will be a great help in feeding stock.

Haverhill (Eben Webster). — Corn is a fair crop, but not up to the average. Rowen will give two-thirds of the usual crop. Late potatoes promise better than early ones, though there is some blight. There will be about a normal crop of fruit. Pastures are in good condition since the rains. Oats and barley are mostly cut for fodder.

Andover (M. H. Gould). — Ensilage corn is looking well; that for grain is light, on account of drought. Rowen is about half a normal crop. Late potatoes are not an average crop, but there is no blight or rot. The prospect for apples is fairly good; pears light; peaches light; grapes and cranberries good. Pastures are all dried up. Oats and barley were half crops. Not much attention is paid to poultry, and our farmers get most of their income from dairy products.

Ipswich (O. C. Smith). — Indian corn is in very good condition. The rowen crop will be small, and there is none on uplands. Late potatoes are a very good crop, but smaller than usual; some blight and rot. All fruits promise well except peaches. Pasturage has about dried up, but is now improving. Oats and barley are average crops, being cut for fodder mainly. Most farmers have some poultry, but only those who make a business of it get income to compare with that from the dairy.

Wenham (N. P. Perkins). — Not much corn is planted in this vicinity, but that on moist land is looking well. What rowen there is will be quite late. Late potatoes are a light crop, though rather better than early. Apples are rather small, but a good crop; small crop of pears; some peaches; but few grapes and cranberries. Pastures are very poor and dry, and cows are fed

twice a day at the barn. The poultry business has fallen off somewhat, and the income from it is not more than one-sixth that from the dairy. Tomatoes are ripening slowly, and bring a fair price. Onions vary a great deal; some fields are quite small, while some others promise a good crop. Fall apples are dropping quite badly, and bring a low price.

Manchester (John Baker). — Indian corn is in good condition. The prospect is that rowen will be a little below the normal. Late potatoes are good with no blight. Apples are a very large crop; good crop of other fruits. Pasturage is in good condition. Oats and barley are about normal crops. All farmers keep a few hens, but there are no extensive henneries.

NORFOLK COUNTY.

Stoughton (C. F. Curtis). — Indian corn varies greatly, and shows wide results in adjoining fields, but would average about 70 per cent of the normal. There is about a one-third crop of rowen. Late potatoes have done well, and show no blight or rot. Apples half a crop; pears three-fourths; peaches average; grapes a full crop; cranberries a full crop. Pastures are just beginning to revive, but are poor except on low land. The income from the dairy is away ahead of that from poultry; probably the latter would be about 20 per cent of the former.

Millis (E. F. Richardson). — Corn is a good crop. Rowen is a poor crop. Blight has appeared on late potatoes, and there will be a short crop. Apples and pears will be big crops; peaches and grapes fair; no cranberries. Pastures are poor and all dried up. Oats and barley were fair crops. A few farmers pay attention to poultry, and the income from it exceeds that from the dairy in some cases.

Medway (Monroe Morse). — Indian corn is 90 per cent of a full crop. There will not be over a one-fourth crop of rowen. Late potatoes promise well; some blight, but no rot. Apples are 25 per cent above an average crop; pears a full crop; peaches a one-third crop; grapes 90 per cent. Since the rains pasturage has come up to the average. Poultry raising is on the increase, but I am not able to state its proportionate importance as compared with dairying.

Franklin (C. M. Allen). — Indian corn is looking well. Rowen will be about half a crop. Late potatoes will give about a three-fourths crop. There is an immense crop of apples; pears good; peaches few; grapes fair and cranberries medium. Pasturage is in poor condition. Oats and barley are 90 per cent of

full crops. Poultry raising is not of much account with our farmers.

Bellingham (J. J. O'Sullivan). — Corn is in good condition. Rowen will be an average crop. There is very little blight on late potatoes. The prospect is for a very good crop of all kinds of fruit. The rains have improved the condition of pastures. Oats and barley are very little grown. Considerable attention is paid to poultry, and the income from it is about 20 per cent of that from the dairy.

BRISTOL COUNTY.

Mansfield (Wm. C. Winter). — Indian corn is somewhat late, but with favorable weather will make an average yield. Rowen will not exceed 70 per cent of a normal crop. Potatoes are large and fine, but not many in a hill; no blight or rot. Apples and pears are from 70 to 80 per cent of a full crop; peaches, 10 per cent; grapes, 50 to 60 per cent; cranberries perhaps a full crop. Pasturage is in fairly good condition for the season. Oats and barley are above average crops. I should judge the income from poultry and the dairy might be about equal.

Norton (W. A. Lane). — Corn is in good condition. On low ground rowen is a good crop. The prospect for late potatoes is good, and there is no rot. Apples, cranberries and grapes are good crops. Pastures are a little dry. Oats are a good crop. Poultry is in advance of the dairy as a source of income with our farmers.

Attleborough (Isaac Alger). — Indian corn is in good condition. Rowen promises to be about 80 per cent of a full crop. Potatoes, early or late, are a small crop. Apples are an average crop, also pears and grapes; cranberries half a crop. Oats and barley are full average crops. Farmers do not pay much attention to poultry, and those who grow poultry do not farm it very much. August was an ideal month, and all crops are growing well.

Westport (A. S. Sherman). — Indian corn is looking and doing well. Very little rowen will be cut. There will be a light crop of potatoes; no rot. Apples, pears and grapes plenty; peaches scarce; cranberries very few. Pasturage is in very poor condition. Oats were a very good crop. Much attention is paid to poultry, and the value of its products is fully one-half that of those from the dairy. Squashes are a total failure. Turnips are looking very fine. Onions a medium crop.

Dartmouth (L. T. Davis). — Corn is looking finely, but, having grown slowly, is rather backward. There will be no rowen. The

crop of late potatoes is poor, but there are no signs of either blight or rot. Apples are three-fourths of a crop; pears one-half; grapes a full crop. Pastures are very poor, but the meadows are furnishing some feed. Oats and barley were average crops for grain, but with lighter straw than usual. Most farmers keep some poultry, and the income from it is perhaps one-tenth that from the dairy.

PLYMOUTH COUNTY.

Brockton (Davis Copeland). — Indian corn is fairly good except some pieces on dry land. Rowen is about a three-fourths crop. Late potatoes are quite good on low land; have seen very little blight. Not many peaches; prospect for other fruits good. Pastures are short and dry. Not much attention is paid to poultry in this neighborhood.

Marshfield (J. H. Bourne). — Corn is a fairly good crop; many pieces suffered from the drought, but are gaining now. Rowen will not be over a one-fourth crop. There is no blight or rot on potatoes, but there will be only half a crop. Apples are very plenty; pears less than usual; peaches good; grapes and cranberries fully up to the average. Pasturage is badly dried up. The drought shortened oats and barley somewhat. Every one keeps poultry, and many in large numbers; the aggregate income from this source exceeds that from the dairy.

Kingston (G. L. Churchill). — Indian corn is a very short crop. Rowen is not half a crop. Late potatoes are a very light crop, with some blight. There will be an average crop of fruit. Pastures are very short. Oats and barley are very short crops. But little poultry is kept in this vicinity.

Plympton (Jacob Parker). — Corn is looking finely and is not drying up. Potatoes are a short crop, but there is no blight or rot. Apples plenty; cranberries an average crop. Pasturage is looking finely, on account of late rains. More attention is paid to poultry than to any other department of farming.

Halifax (Geo. W. Hayward). — Indian corn is looking well, except where dry weather affected it. Very little rowen will be cut in this section. Most potatoes are blighted; no rot as yet, but the crop must be small. Good crop of apples; grapes and cranberries fair. There is no pasturage. Farmers pay a great deal of attention to poultry, and there is much more income derived from it than from the dairy.

Mattapoisett (E. C. Stetson). — Indian corn is in good condition. There is very little if any rowen in this locality. Potatoes are not a very good crop, though there is little or no blight or rot.

Fruits of all kinds promise well. Pasturage is in poor condition. Oats and barley are about average crops. There is a great deal of poultry in this section, and I should think the income derived from it was nearly as great as that from dairy products.

BARNSTABLE COUNTY.

Bourne (D. D. Nye). — Indian corn is in fair condition. The prospect for rowen is very poor. The prospect for late potatoes is very poor, although there is no rot as yet. Apples, pears, grapes and cranberries promise very good crops. Pastures are poor and short, because of drought. Oats are a very good crop, but are grown for fodder only. Very little is done with poultry except on a small scale. Nearly all our milk is sold to the summer people, and those farmers who keep cows all buy their butter.

Mashpee (W. F. Hammond). — Corn is looking very well, and there will be half a crop. Rowen is a failure. There will be about a two-thirds crop of potatoes; no rot nor blight. Apples, pears, grapes and cranberries will each give half a crop. Pasturage is quite good. Oats and barley are failures. Not much attention is paid to poultry raising.

Dennis (Josiiua Crowell). — Indian corn is below the average at this season. No rowen except on low land. The potato crop is very light; no rot noticed. Pears and apples fair crops; grapes quite plenty; cranberries a very small crop. Pasturage is in very poor condition. Oats were rather light. The season has been one of the driest ever known.

Harwich (A. N. Doane). — Indian corn is late, on account of dry weather. The rowen crop is very short. Late potatoes are doing fairly well; no rot. Apples and pears are good crops; not many grapes; cranberries almost a failure. Dry weather has spoiled upland pastures for this season.

Chatham (E. Z. Ryder). — Corn will be a small crop. Rowen is half a crop, owing to the drought. Late potatoes are nearly a failure, with some blight and rot. The prospect for apples and pears is poor; peaches few; grapes average; cranberries less than half a crop. Pasturage is in very poor condition. Oats are about a two-thirds crop. Our farmers don't pay much attention to poultry, though most of them have a flock of hens.

Wellfleet (E. Jacobs). — We have no crop of corn. There will be about one-third as much rowen as last year. Late potatoes are a good crop in most sections. Very few apples and of very poor quality. Pastures are in very poor condition in all sections. About one-third of the income of our farmers is derived from poultry.

DUKES COUNTY.

West Tisbury (Geo. Hunt Luce). — Indian corn is much below the average in condition. There is no prospect of getting any crop of rowen. Potatoes are much below the average; no blight or rot. Prospect for apples, pears, peaches and grapes poor. Pastures are very dry and poor. Oats were about a two-thirds crop. Nearly all the farmers have some poultry, and the income from it is about equal to that from the dairy.

BULLETIN OF

MASSACHUSETTS BOARD OF AGRICULTURE.

POULTRY KEEPING ON THE FARM.

By Arthur A. Brigham, Ph.D., *Kingston, R. I.*

When requested to write "an article that will give hints to beginners and be a help to those who are about starting or thinking of starting in poultry and egg production," my thoughts immediately went back to some of the experiences of my boyhood days on the old farm in Massachusetts. My memory recalls very vividly how one of my attempts to combine horticulture and poultry culture was brought to a sorrowful end, because of rats. As an ambitious young gardener, I had constructed a hot-bed, made two sashes to fit it, and had woven of rye straw a thick mat to cover the whole during cold nights. My early farming under glass prospered, and the plants had been transplanted to the open garden, where they were all, with the exception of the cucumbers, thriving finely. A severe frost one night destroyed the cucumbers completely, thereby teaching the young gardener a seasonable lesson, and perhaps saving several members of the family from the dangers of "summer complaint" later.

The early hatched chickens were doing finely in their regular quarters. A neighbor had that spring obtained some nice Buff Cochin fowls, and later in the season kindly furnished me with a sitting of their eggs. These were given to the care of a motherly sitting hen, and in due time four little golden puff-balls showed themselves. Where to place the yellow-feathered treasures was a puzzle, until the empty hot-bed was thought of as just the place to keep them safe and happy. Here for several days they flourished, to the great satisfaction of their young owner; but pride goes before a fall. One day the four pretty creatures were found stark dead. The youthful poultryman had forgotten that as a gardener he had sought to poison the rats which invaded his hot-bed; and the diminutive chicks proved that the rat poison was fatal to chicken life, if not to rodents.

On another occasion, after faithful attendance at church services, one beautiful Sunday morning in spring the same amateur poultryman returned home to find about forty fine Brown Leghorn chickens, dead or dying, scattered about the yard. The morning mash for the chicks had unwittingly been mixed with water in which some salt meat had been boiled, and they rendered convincing testimony of the deathly danger to chicken life of too much salt in the food.

The third catastrophe, which also brought its lesson, was the destruction in one night, by an army of invading rats, of some forty pigeons, practically cleaning out the loft.

Experience is a dear if not altogether a lovable teacher, and we all have to learn from her to a greater or less extent. I have no great or appreciative respect for the poultryman who "knows it all," and has closed his course in learning; but my sympathy goes out to the one who is studying and advancing in poultry knowledge, particularly if he be an ambitious and enthusiastic beginner in poultry keeping.

On nearly every farm fowls are kept or found. Too often they are allowed to shift for themselves. Some farmers detest hens. Usually on every farm there is, however, some one who is interested in fowls, or at least desirous of the pocket-money which poultry may supply. I know well a Massachusetts dairy farmer who combines very successful poultry keeping with his dairy business. He is one of many such. Lately a Massachusetts farmer told me with great satisfaction of the copartnership which his two boys, one thirteen and the other nine years old, had formed for conducting the poultry business of the farm. These farmer boys are chips of the old block, and are making a success of the business. Sometimes it is the wife or daughter who takes care of the biddies, usually very successfully. Among the poultry women of my acquaintance I will mention one in New Jersey, who took the special course of instruction, with the pioneer class of 1898, at the Rhode Island College of Agriculture and Mechanical Arts. Although not possessed of the best of health, she has made a success of poultry keeping, and, willing to share her success, has, among other helpful things, written a nice booklet for women, entitled "Pocket-money in poultry culture," which I can heartily recommend to the wives and daughters on the farms of Massachusetts.

The idea of special poultry farming on a large scale is extending, and large poultry plants are being quite freely established; but the great bulk of poultry products for the market will continue to come from the numberless small flocks scattered through the coun-

try. The large poultry ranches all together can supply but a very small proportion of the immense quantities of eggs and dressed poultry demanded by an ever-increasing consumption of these articles of food.

How shall the Beginner begin?

In the first place, do not commence on too large a scale, especially if you have had no experience with fowls. The necessaries are the same in kind that are required in almost any productive business. If we were to discuss the things needful in establishing, maintaining and managing a special poultry farm or a great poultry plant, the factors to be considered might be grouped under the terms land, capital and labor. The same means on a small scale are required for the little poultry plant on the general farm. There must be a place for the fowls, money must be invested in buildings, in good birds and in food and other materials; and, finally, work is unavoidable in the care and management of the business.

Location.

Even poultrymen of experience often make mistakes in choosing a location for poultry keeping, hence it is well for the novice to consider the matter quite fully. If fowls have been previously kept upon the farm, the adaptability of one or more places for the purpose may have been tested. In any case, several things need to be carefully considered. The fowls, to do their best, must live in shelter and comfort. The land should not be wet, and stagnant water in the soil is especially to be avoided. A somewhat elevated slope, with a southerly or south-easterly aspect, if available, is usually preferred. A sandy loam soil in such a location is naturally well drained. If the soil is a strong, heavy clay, naturally too moist, it may be artificially underdrained by means of tiles, and thus avoid the surplus moisture which seems to favor the development of influenza and roup in poultry.

The atmospheric drainage is something equally important, though not often taken into account. Every one has noticed, in travelling over the roads, up hill and down dale, in the old Bay State, that the cool and often chilly, moist, heavy air settles to the lower places, and tends to remain there. Fowls should live where the air surrounding them is at least fairly dry, even during the wet, stormy weather of the cooler seasons. The inclemencies of the weather, especially the extreme and sudden changes in temperature during the winter and spring, even in the best locations, test severely the strength of constitution of both feathered and unfeathered bipeds here in New England. Violent winds add greatly

to the discomfort of fowls, if they are exposed to them. Where the houses and yards are frequently swept by searching winds, the fowls abandon the runs, neglect healthful, out-door exercise and huddle stupidly in their houses. It is also undesirable to confine the poultry where in the hot weather the air stagnates, and the sun beats down into the unprotected yards or close houses. Both the cold of winter and the heat of summer must be tempered for the comfort of the birds, if they are to thrive and do well for their owner. Shade must therefore not be forgotten in locating the yards or the ranges and the houses. Oftentimes the hen house can be placed where the apple orchard or some group of trees will furnish both shade and shelter. Fowls delight in the conditions found beneath low-growing pines and other evergreens.

Fenced Runs and Free Range.

One thing had best be definitely settled before attempting to keep poultry on the farm. The fowls should not be allowed to run at will within the garden or in and about the farm buildings. Nothing is more aggravating or disgusting than to have the nice vegetables or beautiful flowers scratched up, and the doorsteps, the porch, the paths and the farm machines and vehicles fouled with poultry droppings. Separate the poultry also from the other live stock of the farm. This is easily accomplished when undertaken in a business-like manner. If the fowls are to be kept near the farm buildings, provide ample yard room, enclosed by wire fencing. The best material for this purpose that I know of at this date is the M. M. S. poultry fencing, which is made of any height ordinarily required, with small meshes below and wider meshes above. It requires ordinarily but few posts, is easily put up and has a very neat appearance when in position. Another way of separating the fowls from the centre of farm operations is to place the houses at a considerable distance from the farmstead, in a pasture, where the fowls will have free range. The latter plan may entail some extra travel by the attendant, and there is the risk in some localities of depredations by foxes, hawks or other wild animals or thieves. The young, strong farmer boy may find advantages in the second or so-called "colony plan," while the housewife will probably find the fenced enclosure near the farm house preferable.

The Houses and Yards.

In a fickle and somewhat rugged climate like that of New England, shelter from the extremes of weather, which check the growth of the fowls and their egg production, is necessary. No doubt some of our domestic fowls, if turned loose in the woods, could adapt themselves

to the natural conditions, and continue to exist; but the process would certainly reduce their egg production, and probably their size. We attempt to provide, by means of proper shelter, a more equable and comfortable climate, and expect remuneration for this outlay of capital in the form of plump chickens and numerous eggs at a season when prices are satisfactory. Whatever the style or form of poultry building contemplated, it should be so placed that storm water and surface-flowage water will flow away from and not into or under the house. For this reason, a knoll or spot where the ground slopes away from the site is a good place to select for the building. If the soil is liable to be soaked with water at any season, it is well to excavate one or two feet deep, and fill in with stones where the building is to stand. Tile drains may also be laid to conduct the soil water away from beneath the house. Dryness within the house is further secured by raising the floor six inches to a foot above the level of the ground surrounding the house.

The Kind of House.

There are many forms of hen houses, some of them desirable, others despicable. Each poultry keeper ought to make a study of this matter, as related to the particular conditions of his location and the scope of his plans. Too many hen houses are adapted only for winter conditions. The effect of each season and of all kinds of weather must be kept in mind, if the house is intended to provide a comfortable home for the fowls throughout the year. Winter and summer quarters and a scratching-shed may be combined in one house or in one room, if so desired. Perhaps I can best explain several essential points in home architecture for poultry by describing, as well as I can in words, a house suited, under favorable conditions, for a flock of thirty farm fowls. It is not forbidden to build of stone or brick or concrete; but I should construct the house of wood, and build on runners, so that it could be readily moved if it ever became desirable to change to a new location or to fresh ground. I think that in a house fairly well ventilated at least 30 cubic feet of air space should be allowed per fowl. For our thirty fowls we must then provide 900 cubic feet of interior space. This we can do if we make the foundation of the house in the form of an oblong, 15 by 10 feet, or of a square, 12½ by 12½ feet, and give the roof an average height of 6 feet. The floor may be of boards, concrete, or of dry dirt to be renewed at intervals. Usually the house faces to the south or south-east. The house is highest at the front, and the roof slanting to the rear should have a sufficient pitch to readily shed

rain and snow water. I must allow that this form is not very artistic or beautiful. It may, however, be improved in appearance by adding a narrow jet in front, pitching toward the south, and placing a little cupola containing a ventilator at the middle of the peak thus formed. The front should be constructed in the form of two large doors, which are to be opened out in bright, warm weather, allowing the sunshine to reach, during some part of the day, each and every part of the room. Wire netting may be used to cover the front when opened. Thus the whole house is readily turned into a scratching-shed on pleasant winter days. A door about 3 by 6 feet is placed at the east end, and a window consisting of a single sash at the west end and both near the front of the house. A single sash window is also placed in each of the large doors which form the front of the house. I might add that windows in poultry houses should be protected on the inside by hinged or sliding frames of wire netting, neatly fitted in place, not too close to the glass.

Scantling (2 by 3) will answer for most of the frame work of the house, which is covered on the outside by common boards, and these again, both roof and sides, with sheathing paper and shingles. Our experience in a very windy location indicates that paper as an exterior covering is very liable to prove unsatisfactory; between the boarding and the shingles, however, it acts as a very effective nonconductor of heat, and helps materially in keeping the house comfortable. In extremely cold situations the house may be sheathed inside if necessary.

Furnishing the House.

The interior fittings of the hen house should be as few and as simple as possible, and all easily removable, so that they can occasionally be placed out of doors in the sunshine and fresh air. The roosting platform may be placed $1\frac{1}{2}$ or 2 feet above the floor, in the back part of the house. It should be made of boards, clear of knots, smoothly planed and closely fitted together. Roosts are not always needed, but if thought to be necessary may be made of 2 by 3 scantling, planed smooth, rounded at the upper edges and placed broadside down about 6 inches above the platform. To insure protection of the fowls during the coldest nights from the danger of freezing their combs and becoming chilled, the space above the platform may be enclosed by a curtain, which in moderate weather is kept up out of the way. For nests nothing is simpler or better than small boxes, which may be placed beneath the platform and open towards the rear of the house. A feeding trough is easily made, in the form of a box 2 or 3 feet long and 6 inches

wide, with sides 3 or 4 inches high. For holding the drinking water an iron or earthenware dish with flaring sides answers nicely. It may be placed on a little platform raised a few inches above the floor, and may be protected by a hinged frame with slatted sides and a slanting board cover. A box for holding a constant supply of oyster shells and grit may be hung at the side of the room. I hope that this rough sketch of a plan has made plain the desirability of so constructing a poultry house that the whole floor space will be available for use by the hens; that it will catch the first rays of the sun in the morning, and, unless clouds interfere, be blessed by sunshine in some part of the house throughout the day; that the house may be tightly closed and yet well lighted in stormy or cold weather; that it may be opened in front on warm days in winter and thrown widely open on three sides in the hot summer weather.

The Yards.

If the fowls are not to be allowed free range, then double yards should be provided, — that is, two yards for each house or pen of fowls. This plan allows the poultryman to cultivate the soil and grow a crop of green grain in one yard while the other is in use by the fowls. The ground is thus frequently freshened and green food is supplied to the fowls. The yards may, as already mentioned, be neatly and economically enclosed by special poultry fencing, which, for most satisfactory results, should be 6 feet in height. For the kind of fencing described, cedar or chestnut posts, 5 or 6 inches in diameter, should be set at least 2 feet deep in the ground, about 15 feet apart. Gates wide enough to admit a horse and cultivator should be made for the yards. Frames of wood covered with wire netting will answer the purpose, or very neat iron gates may be purchased to match the fences. They should be placed conveniently near the house, and be connected by good strong hinges and latches to stout, erect, firmly set posts.

Can the Hens' Home be made Attractive in Appearance?

Instead of being a blot on the landscape and a disgrace to the farm, the poultry house and yards should be made attractive to the eye. The shingles may be left to nature, to be weather tinted in simple gray, or may with creosote stain be given any color desired to harmonize with the surroundings. The necessity of shade in summer gives opportunity for pleasing effects in the arrangement of trees and vines in the yards and about the houses. Advantage may be gained by the use of fruit-bearing plants for

this purpose, as is delightfully evidenced by a little poultry plant that I happen to know of in East Greenwich, R. I. Without large expenditure of capital, a number of neat poultry houses have been grouped among the large, beautiful trees at the rear of the dwelling-house. Fruit trees in the yards and grape-vines trained upon the fences furnish an agreeable shade in summer for the fine fowls, and an abundance of luscious fruit in the autumn for the refreshment of the owner and the numerous friends whom he delights to entertain. The effect is very happy in several ways, but I make mention of this aspect especially because of the pleasing harmonious part which this little poultry plant makes in the landscape at "Paradise Farm."

Breeding the Birds.

All the preparations for properly housing the flock having been completed, next comes the momentous question of what breed to select and where to get the best fowls to start with. It is a problem for earnest study, and each poultry keeper must work it out for himself. Consider the market, the local conditions and your own likes and dislikes in the matter. In New England one will not usually go far wrong if he selects one of the so-called American breeds. The Barred and White Plymouth Rocks and the White Wyandottes are great favorites. Of more importance, however, than the breed is the quality of the individual birds selected. Every breed includes poor specimens, which would prove unprofitable under even the best of conditions, and your nice new poultry houses should shelter only first-class business birds. Here is opportunity for the wise use of considerable capital and brains as well. If you have had some experience in selecting fowls and know a good bird when you see it, all the better for yourself and your poultry business. If you have a lot of mongrels or fowls of mixed blood, work them off as you find opportunity to do so advantageously, and purchase of some reliable breeder of really first-class poultry a pen or at least a trio of the best fowls he will sell you, and pay the price. You may prefer to purchase several sittings of eggs from such a poultryman, and commence your flock of thoroughbreds in this way. This is successfully done in some cases, but there is often the risk to run of disappointment, besides delay in getting well started. When your valuable fowls begin to lay, keep a record of their eggs, using trap nests if necessary; and in hatching note which eggs produce the most and the best chicks. As the chicks grow and develop, note which ones are the most thrifty, which are the earliest to mature, which are plump enough for the table at any age, which develop into early layers, which resemble

most their parents and in what respects, and which come nearest the type of the breed. Study all the characteristics, with the idea of learning which birds to select for future breeders. (It is not best here to enter into a discourse upon the principles of breeding, but any one especially interested will find something bearing upon this subject in the twelfth and thirteenth annual reports of the Rhode Island Agricultural Experiment Station.) In the poultry business it is rarely best to have but one string to your bow. In exceptional cases it may be well to depend almost wholly upon the sale of eggs for the income, in others to raise broilers, young roasters or mature fowls for the market; but usually it is well to combine some or all of these, and to also sell eggs for hatching, and dispose of surplus high-class birds for breeders. Combine as many sources of income as are profitable, and push the lines that are most remunerative. It is with this idea in mind that I have strongly advised the purchase of the finest fowls obtainable. The next step is to improve them, which can be done if the poultryman will persist in his study of the individual fowls, watch the results of his matings, learn to trace cause and effect, and provide better surroundings and conditions than the fowls have previously been accustomed to.

Hatching and raising the Chicks.

If only one hundred or two hundred chicks are to be raised each year, it is certainly a safe and wise plan to depend upon hens to do the hatching and brooding. Pullets which prove to be good sitters and mothers may usually be depended upon to do still better in these respects the next year. If a hen house or room in some farm building is available, an excellent plan is to place a large number of nests in it, and devote the same to the exclusive use of the sitting hens during the hatching season. Orange crates or soap boxes will answer for nests if the poultryman wishes to be very economical. Each nest should be provided with a lattice door in front. I like the idea of placing in the box two or three inches of loam beneath the nesting material, which usually consists of soft hay or cut straw. If convenient, move the broody hens at night to their new nests, and allow them to sit for a day on nest eggs, unless you are sure enough of their good character as sitters to immediately place under them the eggs which they are to incubate. Remove the hens from their nests daily at a regular time, supplying them with fresh water, whole corn or other grain, and provide an abundance of dry, fine soil, so that the fowls can freely and fully dust themselves. Use plenty of Pyrethrum powder or other insect destroyer in the nests and on

the fowls, working it thoroughly in among their feathers. Spray the room once a week with a one per cent. solution of carbolic acid, and remove or cover with dust the droppings of the fowls. Keep the room well ventilated, — in fact, make the conditions continuously healthy.

If by using hens the chicks are not hatched sufficiently early in the season or in large enough numbers, or if you think that the hens can better employ their time in laying eggs than in hatching them, you are not forbidden to procure an incubator and brooder, or, in fact, several of them, provided the business warrants the expenditure of capital for this purpose. It is easy to learn to run an incubator. The chief difficulties in chicken culture come before and after incubation. They are found in the successful breeding of fowls to lay eggs that possess strong fertile germs, capable of producing vigorous chicks, and in successfully raising the creatures, after hatching, to marketable size or to maturity.

Artificial Mothers.

A study of the brooder problem at the Rhode Island Agricultural Experiment Station sheds considerable light upon the subject of the artificial raising of chickens. According to Bulletin No. 61 of this station, the causes of the numerous deaths of incubator chicks raised in brooders may be grouped under: —

(*a*) Heredity, or to environment during the period of incubation.
(*b*) Mechanical causes.
(*c*) Imperfect sanitation.
(*d*) Improper feeding.

Under the first heading (*a*) a hint is given that successive alternate periods of heat and cold during incubation are responsible for a large proportion of abnormalities in chicks. Experiments recently undertaken in Germany have strongly emphasized this matter.

Among mechanical causes (*b*) are included crowding and huddling, which, though inexcusable, are far too prevalent, because of the ambitious desire of the poultryman to keep under one hover as many chicks as possible. The remedy is evidently to be found in not crowding. Twenty-five chicks are as many as the novice, at least, should attempt to accommodate under one hover.

Under imperfect sanitation (*c*) is included lack of pure air, sunlight and cleanliness. Tuberculosis, for example, is by these conditions given an excellent opportunity to attack the little creatures. Prevention is in this case the best plan. The hovers should be removable, and, if placed out of doors on bright days in the fresh air where the sunshine can get at them, the germs of

this dread disease soon succumb. Careful spraying of the interior with a one per cent. solution of carbolic acid helps to keep the conditions sanitary.

Under the head of improper feeding (*d*) very striking results were obtained by feeding different lots of chickens rations which varied in the extreme. The experiment with the chicks kept in the brooders showed at the end of thirty days, in the lot fed on egg, liver and green stuff, a mortality of 63.7 per cent, chiefly from digestive troubles, resulting in diarrhœa. The lot fed on grain alone showed a loss by death of 32.7 per cent, mainly from digestive troubles, strongly indicated by abnormal enlargement of the gall bladder. The lot fed on grain and green stuff suffered a mortality of 9.5 per cent. The lot fed a complete balanced ration of egg, meat, grain and green stuff had a death list of only 3.5 per cent. By using the proper amount of animal food with the grain food and supplying the necessary green food, a large proportion of the untimely and unnecessary deaths may evidently be prevented; provided, of course, that due attention be given to the other factors of environment, and to the breeding from vigorous, healthy parents.

Another phase of the brooding problem relates to the degree of shelter, the maintenance of a proper temperature and ventilation for the chicks. The sudden variations of the weather during winter and spring in New England make it desirable that there be provided four degrees of protection or comfort for brooder chickens: —

1. An inviting, properly ventilated hover, kept continuously, uniformly and sufficiently warm, to which the chicks may at any time resort, as they would to the mother hen, and warm up.

2. A ventilated, lighted brooder or apartment, warm enough to protect the checks from chilling on raw days and sufficiently attractive to tempt them from the hover as much as possible.

3. A run protected from winds and storms by being enclosed within a brooder house, or, if outside, covered with a hot-bed sash.

4. An outside yard, available in pleasant weather, into which even the youngest chicks should be tempted by litter, grain, green food and scraps whenever the sun shines and the winds are not too severe. In some way the chicks must be provided with a sure refuge, where they will be comfortable whatever the weather. They should, however, by every means possible be induced to keep out in the fresh air and take exercise as they would with the mother hen in the pleasant spring weather. These hints will also apply to a considerable extent to chicks raised by the natural method.

One of the secrets of successful chicken raising is to keep them constantly growing. To do this, no condition can be tolerated which gives the animal a check in its development. As soon as the young pullets can be distinguished from the cockerels, the birds of different sexes should be separated, and the pullets at any rate should be given free and abundant pasture range. They will thus obtain a sure supply of green food, and will usually find considerable animal food in the form of grasshoppers, worms and various insects, which will help to balance the grain food commonly supplied them. The poultryman is fortunate if he is able to pasture the growing birds where they can easily find running water to drink.

Selling the Products.

Sell direct to the consumer, if possible. Dispose of the poultry products at the time when the condition of the same and the state of the market yield the greatest net profit. In some localities a chicken will bring more as a broiler (at one or two pounds) or as a young roaster (three to four pounds) than at maturity, and the food and care necessary for the added growth and weight may be saved. In culling out the chicks to be killed and sold as dressed poultry, do not sacrifice the promising young thoroughbreds. Save them for breeders, to replenish your stock, and, in case of a surplus, especially of cockerels, to sell to other poultrymen. In disposing of eggs, some poultry keepers find it profitable to sell to special customers, who are ready to pay more than the market price for them. Ordinarily, however, the eggs will go into the regular market. Even in this case it pays to be careful that the product is fresh laid, clean and uniform in size and color. This problem of the successful disposal of poultry products after the labor and care of their production is one which varies greatly, according to the conditions in each case. It must be studied out on the spot. Fortunate will it be for the profits if the poultry keeper is a shrewd salesman. One thing at least should be insisted upon: the farmer's wife or son or daughter who undertakes to care for the poultry should receive the income which comes from all products sold, and full value for all eggs and chickens furnished for the table.. The laborer in the poultry yard is worthy of his hire.

The Poultry Keeper should be an Account Keeper.

One thing further I desire to emphasize most earnestly; that is, the keeping of records and accounts. Here is where most farmers and poultrymen lack. They do not know actually how their business stands financially, and are really often working at a great disadvantage, because they do not actually realize which part of

their farm operations are bringing profit and which are entailing loss. In the case of the poultry keeper, the matter is not one of difficulty and need not require much time. A record should at least be kept of the eggs laid daily by each flock or pen of fowls; and after the doing of this has become a habit, it will not require much urging to induce the interested poultryman to keep individual records of the egg production of his best breeders.

The financial record is also a simple affair. An inventory is made at least once a year of all the capital invested in the land, the buildings, fences, furnishings, tools, fowls, and of the estimated value of the poultry products on hand. The sum total of all these values is, in commencing the account, charged against the business; that is, placed on the debit side of the account. Then, during the year (or shorter period of time, if desired), everything that is purchased, including food, tools, lumber, nails or supplies of any kind, new fowls, etc., and every hour of labor at a fair price, is charged against the business. On the other hand, the value of every egg and every fowl sold or used for the house table and of everything that is disposed of, including the poultry manure and the feathers if they can be sold, is placed on the credit side of the account. At the end of the year, or, in fact, whenever the poultryman wishes to balance his accounts, a new inventory is made of all the belongings of the poultry plant, including new purchases, fowls, tools, etc., and the estimated value of all the poultry and poultry products and food on hand. The sum of these is placed on the credit side of the account. The difference between the total amounts of the debit and credit sides of the books should show the actual profit or loss. We will hope that it is a good round sum on the right side of the account.

Series of 1900. Bulletin No. 5.

MASSACHUSETTS

CROP REPORT

FOR THE

Month of September, 1900.

ISSUED BY

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BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 Post Office Square.
1900.

Crop Report for the Month of September, 1900.

Office of State Board of Agriculture,
Boston, Mass., Oct. 2, 1900.

Bulletin No. 5, Crop Report for the month of September, is herewith presented. We desire to call the particular attention of our readers to the article on "The Relation of Agriculture to the Public Health," by Dr. Samuel W. Abbott, Secretary Massachusetts State Board of Health.

Progress of the Season.

The September report of the statistician of the United States Department of Agriculture gives the condition of corn as 80.6. There was a decline during August amounting to 6.9 points, and the condition on September 1 was 4.6 points lower than last year, 3.5 points lower than at the corresponding date in 1898, and 1.1 points below the mean of the September averages for the last ten years.

The condition at harvest of winter and spring wheat combined was 69.6, against 70.9 last year, 86.7 in 1898, and 80.9, the mean of the September averages of the last ten years.

The average condition of oats when harvested was 82.9, against 85 on August 1, 87.2 last year, 79 in 1898, and 79.8, the mean of the September averages of the last ten years.

The average condition of barley when harvested was 70.7, against 71.6 on August 1, 86.7 last year, 79.2 on the corresponding date in 1898, and 83.9, the mean of the September averages of the last ten years.

The condition at harvest of winter and spring rye combined was 84.2, against 82 on September 1 last year, 89.4 in 1898, and 86.5, the mean of the September averages for the last ten years.

The average condition of buckwheat on September 1 was 80.5, as compared with 87.9 on August 1, 75.2 on September 1 of last year, 88.8 in 1898, and 86.3, the mean of the September averages for the last ten years.

There has been a general decline in the condition of tobacco since August 1. Maryland, Ohio, Kentucky and Wisconsin still report 3, 11, 8 and 6 points above their respective ten-year averages, but in Pennsylvania, Virginia, North Carolina, Tennessee and Missouri the condition is 12, 25, 20, 10 and 4 points below such average.

The average condition of potatoes was 80, against 88.2 August 1, 86.3 last year, 77.7 in 1898, and 77.4, the mean of the September averages for the last ten years.

The whole of the 13 States having 10,000 acres or upward in sweet potatoes at the eleventh census report a decline in the condition of the crop during August.

The clover-seed acreage shows a considerable shrinkage, only Michigan and Iowa, of the States of commercial production, showing an increase.

There has been an improvement during the month of 4 points in the condition of sugar cane in Louisiana, and it is now 11 points above the ten-year average.

The whole of the States having 10,000 acres or upward of sorghum at the eleventh census report a more or less marked decline in condition during August.

A decline in the condition of rice is reported from every rice-growing State except Louisiana, where there is no appreciable change.

While there was a decline in the condition of apples in almost every important apple-growing State, the condition on September 1 was still above the ten-year average in 37 of the 45 States from which reports were received.

The peach crop of 1900 has been one of the largest, if not absolutely the largest, on record, the production in New Jersey, North Carolina, South Carolina, Alabama, Mississippi, West Virginia and Tennessee being double, or nearly double, the ten-year average.

The condition of grapes is above the ten-year average in New York, Ohio, Kansas, North Carolina, Virginia and Indiana, and below in California, Missouri and Illinois.

The decrease in the number of stock hogs being fattened, as compared with the number one year ago, was too manifest to be a matter of doubt, except as to its exact extent.

The average condition of cotton was 68.2, as compared with 76 a month previous, 68.5 last year, 79.8 in 1898, and 76.6, the mean of the September averages for the last ten years.

In Massachusetts the condition of corn September 1 was given as 94; the average condition of rye when harvested as 92; the average condition of oats when harvested as 96; the average condition of barley when harvested as 90; the average condition of buckwheat as 89; the average condition of potatoes as 72; the average condition of sorghum as 95; the average condition of apples as 85; the product of peaches compared with a full crop as 69; the average condition of grapes as 89; the average condition of tobacco as 103; the number of stock hogs compared with last year as 97, and their condition as to size and weight as 99; the acreage of clover seed compared with last year as 100, and the condition of the crop as 75.

Temperature and Rainfall for the Whole Country.

[From the United States Climate and Crop Bulletins.]

Week ending September 3. — The week was warmer than usual throughout the entire country, with the exception of a belt extending from eastern Washington southward to southern California, where there was a slight deficiency. There was a deficiency in precipitation generally throughout New England, the Middle Atlantic States, the Ohio valley, in the northwest from Wisconsin westward to the Pacific coast, and in portions of the South Atlantic and Gulf States. From the upper Lake region south-westward to Texas and in portions of the South Atlantic and Gulf States there has been an excess.

Week ending September 10. — The week was much warmer than usual east of the Rocky Mountains, the Middle States and the Missouri valley showing the greatest excess of temperature. In California, Nevada and Oregon the week was cooler than usual. There was more than the usual amount

of rain in Florida, the western Gulf States, portions of Oklahoma, New Mexico, New York, Ohio and Illinois, and throughout the north-west. Throughout the greater portions of New England, the Atlantic Coast States, the central valleys and the northern portion of the Gulf States there was practically no rain.

Week ending September 17. — Over the western portions of the middle and southern plateau regions and the greater part of California the week was cooler than usual. Over the greater part of the country east of the Rocky Mountains, however, as during the past seven weeks, the temperature was above the normal. Heavy rains fell over the Atlantic coast and east gulf districts and from Kansas northward. More than the usual amount of rain also occurred on the north Pacific coast. The week was drier than usual from the central and west Gulf States northeastward over the central Mississippi and Ohio valleys, including the Lake region and the western portions of the Middle Atlantic States.

Week ending September 24. — The week averaged warmer than usual in the southern states, in the extreme northern districts from the upper Lake region to Montana and northwestern Washington. Nearly normal conditions prevailed along the New England and middle Atlantic coasts. Elsewhere the week generally averaged cooler than usual. Very heavy rains fell over central and northern Louisiana and thence northward over the Missouri and upper Mississippi valleys. There was also more than the usual rainfall on the north Pacific coast and in portions of the Lake region and northern New England. Along the Gulf and Atlantic coasts, and over the greater part of the Lake region and the Ohio valley, the week was drier than usual.

Special Telegraphic Reports.

[Weather Bureau, Boston.]

Week ending September 3. — New England. Boston: Week warm and dry; corn ripening rapidly, crop average; buckwheat promising in northern section but poor in southern; beans and cabbages excellent; onions and pota-

toes medium; melons small; apples favorable; blackberries, plums and grapes abundant; peaches poor quality.

Week ending September 10. — New England. Boston: Temperature seasonable; little rain, drought severe; fodder light; pastures failing; buckwheat improving; sweet corn fair; canning in progress; apples falling more than last week; cranberries medium; carrots, beets and onions small; tobacco curing well.

Week ending September 17. — New England. Boston: Cool week; heavy rains on 16th; much damage by high winds on 12th; large percentage of apples, pears and peaches blown off trees; growing crops suffered severely from drought first of week; buckwheat and millet light.

Week ending September 24. — New England. Boston: Cool; much rain; meadows revived; pastures little benefited; buckwheat fair in northern part, poor in southern; turnips, pumpkins and small celery doing well; apples below average; farmers plowing and seeding fall grain.

The Weather of September, 1900.

The weather of September was characterized by a high average temperature, more than the usual number of clear days and rainfall above the normal for the month. While the temperature was in excess of that usually experienced in this month, it was so equitably distributed as not to impress the casual observer as being more than the average. There were no excessively warm days. The highest temperature registered at the office of the Weather Bureau, Boston, was only 91°, and only on two days. The minimum temperature, however, ranged unusually and continuously high. With slight exceptions it ranged in the 50s and 60s throughout the month, at Boston. In the interior and western portions of the State the mercury ranged much lower than in coast sections. The coolest period was from the 18th to the 20th, when frost occurred in many localities, and in a few instances, where the conditions were especially favorable, thin ice formed. The closing days of the month were cool. Notwithstanding the fact that the average precipitation was considerably in excess of the normal of the month, there

were more than the usual number of clear days, and the per cent of sunshine was also in excess of the average. The rainfall was chiefly the result of two general storms, during which the precipitation was very heavy. At Boston 3.70 inches of water fell from the 16th to the 18th inclusive, which is an inch in excess of the normal rainfall of September at that point. The severe wind storm of the 12th was a conspicuous feature of the weather of the month. The gale was general and continued through a large portion of the day. It attained a velocity at Boston of 60 miles per hour, reaching its greatest force in the eastern parts of the State. The preponderance of fair weather during the month was favorable to outdoor pursuits but resulted in disastrous forest fires and droughts in many sections of the State.

In the circular to correspondents returnable to us September 22 the following questions were asked: —

1. How does Indian corn compare with an average crop?
2. Are rowen and fall feed up to the usual average?
3. Has the average amount of fall seeding been done, and what is its present condition?
4. How does the onion crop compare with a normal crop?
5. Are potatoes a normal crop in yield and quality?
6. What is the prospect for root crops, celery and other late market-garden crops?
7. How has the apple crop turned out? What was the effect of the gale of the 12th, and what disposition has been made of the fruit shaken from the trees?
8. How have pears, peaches, plums, grapes and cranberries turned out?

Returns were received from 144 correspondents, from which the following summary has been made: —

Indian Corn.

Indian corn is generally rather more than an average crop in western and central sections of the State. There are some complaints of shortage in these sections, but these are more than balanced by reports of unusually good crops. In the eastern and south-eastern counties the crop is probably not quite up to the average, though it approaches more nearly

to it than almost any crop. It is now practically all secured, without damage from frosts, and the stover is generally bright and promises to be of good nutritive value.

Rowen and Fall Feed.

The severe drought of the first part of the month, taken in conjunction with the condition of drought then generally prevailing, has reduced the rowen crop to far below the normal in all sections, and in many it is practically a failure. The rains of the second and third weeks of the month, though coming too late to save the rowen crop, did much to improve fall feed, but it is still far below a normal condition. Much rain is needed to put grass roots in mowings and pastures in even fair condition.

Fall Seeding.

Much less than the usual amount of fall seeding has been done, owing to the previous drought, and much of that put in is only just coming up. It is therefore difficult to form an estimate as to the condition, but the returns would seem to indicate that, on the whole, it is somewhat below the normal.

Onions.

Onions are quite generally less than an average crop. They are generally reported as small, owing to the drought, and in many sections their unusual numbers will not make up for this condition. Blight is not reported and they seem to be generally curing well.

Potatoes.

The drought cut the potato crop short in all sections, and for the State as a whole there is probably not over a two-thirds crop. The tubers are quite generally reported as being small. There are but few complaints of rot and the quality appears to be excellent in most cases.

Root Crops, Celery, etc.

The prospect for root crops is not flattering, though the recent rains have improved them, and with frequent rains in the future they may do better than is expected. Celery ap-

pears to be a fairly good crop, though there are some complaints that the stalks are short and small. Other late market-garden crops have suffered much from drought, and will generally be below the normal.

Apples.

Up to the time of the gale of the 12th inst. apples promised to give one of the largest crops ever gathered, but it appears to be a conservative statement to say that the gale shook off from one-third to one-half of them, except in very sheltered locations. These windfalls were not ripe at the time and there has been no sale for them except for cider apples. Many report that there has been nothing done to utilize them, but the general plan seems to be to make them into cider for vinegar making. Those remaining on the trees should bring a better price than if all that were on the trees prior to the gale had come into the market, and so make up for a portion of the loss. Baldwins appear to have suffered less than other varieties from the gale. The fruit is generally fair and free from blemish, though rather small, owing to the drought and the large amount on the tree.

Other Fruits.

Pears were a fair crop, but the later varieties suffered much from the gale. Plums were a light crop. Peaches were well up to the average, but suffered in the gale. Grapes are generally a very good crop. Such returns as we have in regard to cranberries, which are few, would indicate that there is not much, if any, over half a crop.

NOTES OF CORRESPONDENTS.

(Returned to us September 22.)

BERKSHIRE COUNTY.

Monterey (Wm. S. Bidwell). — Indian corn is a full crop. Rowen and fall feed are about up to the usual average. Hardly any fall seeding has been done. Potatoes are about a normal crop in yield and quality. The prospect is good for root crops, celery and other late market-garden crops. The apple crop is short on account of the gale; windfalls used for cider. Pears plenty; no peaches; a few plums, grapes and cranberries.

Tyringham (E. H. Slater). — Indian corn is better than an average crop. Rowen and fall feed are not up to the usual average, owing to dry weather. Not much fall seeding and ploughing have been done. Onions have made a fair yield. Potatoes are very small but of good quality. The apple crop is not as good as last year and was badly injured by the gale of the 12th. Much of the fallen fruit will be fed to stock. Pears and plums have turned out well.

Lee (Alonzo Bradley). — Indian corn is a full crop. Rowen and fall feed are not over 40 per cent. of the usual average. Potatoes are about 60 per cent of a normal crop. Apples are nearly an average crop; one-third of them were blown off in the recent gale and will mostly be made into cider. Pears are a full crop; peaches 20 per cent; plums 90 per cent; grapes 30 per cent.

Peru (J. P. Sennett). — Corn is fully up to the average. Rowen and fall feed are not as good as usual on account of the dry season. I do not know of any fall seeding having been done. Potatoes are a very light yield, rotting some; quality good. Turnips are of good quality but small for the season. The apple crop was enormous but a large quantity were blown from the trees; no disposition made of them.

Dalton (W. B. Barton). — Corn is about an average crop. Rowen and fall feed are not over half crops. The usual amount

of fall seeding has been done and it looks fairly well. Potatoes are not over a two-thirds crop. The prospect is good for root crops, celery and other late market-garden crops. There is a large apple crop, though one-third of them were blown from the trees and have been mostly used for cider. Pears and plums are good crops. Silos are mostly filled, without frost. Store cattle low; no sale.

Hancock (C. H. Wells). — Corn is nearly an average crop. Rowen and fall feed are very short. There has been very little fall seeding done. Potatoes are about half a crop, with many small ones; no rot to speak of. Apples are a large crop but from one-third to one-half of them are on the ground and no use is being made of them. Pears are a good crop, other small fruits scarce.

Cheshire (L. J. Northup). — Indian corn compares very favorably with a normal crop. Not very much rowen has been cut and fall feed is 50 per cent off in condition. Since the rains fall seeding has commenced in earnest and the amount will be a full average. Potatoes are about 90 per cent of a normal crop in quantity, quality good. Root crops are not up to the average; celery looks fairly well; dry weather hurt market-garden crops somewhat. About one-eighth of the apple crop was shaken off and cider will be made of them. There are still plenty left. Pears were quite plenty; plums very plenty: few grapes raised and no cranberries.

Florida (E. D. Rice). — Corn matured well and is an average crop. Rowen and fall feed were very light, owing to dry weather. Much of the fall seeding did not catch well. Potatoes are about a three-fourths crop, of good quality. No celery is raised; turnips and cabbages give a normal yield. One-fourth of the apples were blown from the trees; some were sold and some were fed to stock. Other fruits were abundant.

FRANKLIN COUNTY.

Monroe (D. H. Sherman). — Indian corn is a very good crop, what little there was planted. Rowen and fall feed are up to the usual average. Potatoes are about a three-fourths crop, of good quality. The prospect for root crops, celery and other late market-garden crops is fair. Apples were a fair crop before the gale, which took off from one-third to one-half of them; there is no market for the windfalls and they are mostly still on the ground. Pears are a good crop; no peaches; some plums and grapes; cranberries good.

Heath (O. D. Canedy). — Indian corn is a fairly good crop. Rowen and fall feed are not up to the usual average. Not much fall seeding has been done as it has been too dry. Potatoes are not a normal crop. There is an abundance of apples; not much has been done with the windfalls. Pears are plenty; peaches few; plums not plenty; grapes and cranberries few.

Charlemont (S. W. Hawkes). — Indian corn is a better crop than commonly but is somewhat late. Rowen is a good crop, but pastures are very dry. Almost all of the fall seeding is done in corn and is looking well. Potatoes are of good quality, but the yield is small, owing to dry weather. Root crops and late market-garden crops are looking fairly well. The apple crop is immense, but a large proportion of them blew off and are still on the ground. There is a good yield of pears, peaches, plums and grapes.

Buckland (C. E. Ward). — Corn is a good crop, probably above the average. Rowen and fall feed are not up to the usual average. Less than the usual amount of fall seeding has been done, owing to dry weather. Potatoes are below the normal in yield; quality good. We have apples to burn; Greenings were badly shaken in the gale; nothing is done with the fallen fruit.

Shelburne (G. E. Taylor). — Corn is above an average crop. There is but little rowen and pastures are very short. The usual amount of fall seeding has been done, but the dry weather has hurt it some. Potatoes are below the average in quantity and quality. The gale of the 12th stripped fall apples pretty clean and shook off from 25 to 50 per cent of the winter fruit, but there are plenty left. Pears and peaches were a light crop, but plums were quite plenty.

Montague (C. S. Raymond). — Indian corn is a good average crop. Rowen and fall feed are not in good condition. About the usual amount of fall seeding has been done, but it is backward and not looking well. Onions are about a normal crop. Potatoes are of good quality but somewhat below the normal in yield. Dry weather has had its influence on root crops, but they are now doing fairly well. There is a fair supply of apples, though the gale blew off a good many, which are being made into cider. Pears are plenty; peaches very few; plums practically none; grapes about average.

Wendell (N. D. Plumb). — Indian corn shows the largest acreage and yield for twenty years. Rowen and fall feed are about half the normal. There has been very little fall seeding to date. Potatoes are about two-thirds of a normal crop. Root crops, celery and late market-garden crops were nearly ruined by the drought. The apple crop was the most promising for years, but

the gale took off fully one-half of them, which will be made into cider.

Leverett (W. L. Boutwell). — Corn is rather better than an average crop. Rowen and fall feed have dried up badly. Less than the usual amount of fall seeding has been done, and what there is in does not look promising. Onions are not above an average crop. Potatoes are not up to the normal; most fields have blasted and many are rotting. From one-third to one-half the apples on the trees were blown off and will be used for cider. It has been a good year for all fruits.

HAMPSHIRE COUNTY.

Enfield (D. O. Chickering). — Indian corn is above an average crop. Rowen and fall feed are up to the usual average. Potatoes are a normal crop in yield and quality. Root crops are good, but late market-garden crops are rather slim. The apple crop promised very well, but they were blown off badly in exposed situations. Pears very good; few peaches; plums good; grapes plenty but do not ripen well; few cranberries.

Pelham (J. L. Brewer). — Indian corn compares favorably with the usual average. Rowen and fall feed are not up to the usual average. But little seeding has been done and that put in is not up yet. There is only now and then a good crop of potatoes. Root crops, celery and other late market-garden crops are in good condition where there has been enough moisture to keep them growing. The apple crop promises well, but one-half of it was blown from the trees by the gale of the 12th, and the windfalls are being converted into cider. Almost all fruit is fairly abundant.

Amherst (Wm. P. Brooks). — Corn is slightly above the average. Rowen and fall feed are up to the usual average. Almost all seeding is done in corn and the condition is good. Onions are rather small, having been injured by thrips, but are well ripened. Potatoes are a little below the average, but are a fair crop. Roots and celery are in fine condition; cauliflower and cabbage have been much injured by dry weather. The apple crop is large, and though the fruit is a little undersized the quality is good. From one-third to one-half were blown from the trees, according to exposure; the best will be barrelled and sold and the balance will probably mostly go into cider. Pears are a good crop, but much blown off; peaches good and but little damaged by the wind; plums unusually fine; grapes good.

Westhampton (H. A. Parsons). — Corn is 90 per cent of a full crop. Rowen and fall feed are three-fourths crops. Less than

the usual amount of fall seeding has been done and it is not in very good condition. Potatoes are about a two-thirds crop and are bringing about 60 cents per bushel. Root crops, celery and other late market-garden crops will not be up to the average. About one-third of the apple crop was blown off by the gale of the 12th and no disposition has been made of them. Pears were a good crop; not many peaches or plums; grapes a good crop.

Chesterfield (Horatio Bisbee). — Indian corn is a full average crop. Rowen and fall feed are far behind the usual average. On account of drought but little seeding has been done as yet. Potatoes are not a normal crop in yield and size but are of fair quality. The apple crop is good, though nearly half of it was blown from the trees; few have been picked up as yet.

Cummington (S. W. Clark). — Corn is a little above a full crop and is well ripened. Rowen is half a crop at best, on dry lots none; fall feed is short, but is now growing. No fall seeding has been done, as it has been too dry. Potatoes are perhaps a three-fourths crop and are rotting. Root crops look well but are not harvested yet. There was a heavy crop of apples before the gale, which blew off about half. A few have stored the blown-off fruit, but many have done nothing with it. Pears and plums are a full crop and very nice; grapes not ripe yet.

Worthington (C. K. Brewster). — Corn is about an average crop. Very little rowen will be cut and fall feed is short. But little seeding has been done on account of the dry season. Potatoes are not more than half a crop. Root crops and late market-garden crops are nearly up to the average. Nearly half the apples were blown from the trees, and as they were not fully ripe will probably go to waste. Pears, peaches, plums and grapes have done fairly well.

Middlefield (J. T. Bryan). — Indian corn is a good average crop. Rowen and fall feed are very short, owing to drought. No fall seeding has been done. Potatoes are of good quality but not over a three-fourths crop. Apples were abundant, but about half were blown off by the gale of the 12th. The windfalls will be used for cider or feeding. Small fruits have been abundant.

HAMPDEN COUNTY.

Chester (P. M. Adzima). — Indian corn is about an average crop. Rowen is about half an average crop. Not much fall seeding has been done on account of the dry weather. Potatoes on moist soil will yield well and are of good quality. The prospect is good for root crops, celery and late market-garden crops. The

apple crop has not turned out well, as many were shaken off by the gale and will not keep well. Pears, plums, peaches and grapes did well.

Blandford (E. W. Boise). — Indian corn is a full average crop. Fall feed is short and there is no rowen to cut. Potatoes are about 60 per cent of an average yield, of medium quality. The prospect for root crops, celery and other late market-garden crops is poor; turnips are small and woody. About 30 per cent of the apples were shaken from the trees by the gale, but those left will probably be of more value than the entire crop would have been had it ripened. Pears, peaches, plums and grapes were full average crops. The drought has been very severe; much stock is fed at the barn and many mowings have received permanent injury.

Granville (Joseph Welch). — Corn is a fine crop this year. There is no fall feed and but very little rowen. There has been very little fall seeding done as the ground has been too dry. Potatoes are about a one-third crop. The apple crop has turned out very heavy; not much is done with the windfalls. Small fruits turned out very well.

Westfield (C. F. Fowler). — Indian corn is a full average crop as to ears, but the stover is light. Rowen is a very light crop, but the late rains have helped fall feed. The usual amount of fall seeding has been done, but the early sown will have to be reseeded. Potatoes have made a light yield. Celery is not over half a crop; roots suffered from early drought. An average apple crop was promised, but the gale of the 12th took off from one-half to three-fourths of them. But few pears; peaches good and plums good; grapes abundant.

Agawam (R. De Witt). — Corn is a little less than an average crop. It has been too dry for rowen and fall feed. Less than the usual amount of fall seeding has been done because of drought. Onions are a poor crop. Potatoes are less than a normal crop. The gale of the 12th took a third of the apple crop and perhaps half. Pears, peaches and plums are good crops.

Longmeadow (W. F. Emerson). — Corn is fully up to an average crop. Rowen and fall feed are up to the usual average on well-fertilized land. Less than the usual amount of fall seeding has been done, owing to the ground being so dry. Potatoes are a light crop, of good quality. The apple crop is light, though not as many were blown off as might have been expected. There was a light crop of pears and peaches; very few plums; a good crop of grapes.

Wilbraham (F. E. Clark). — Corn is not well filled out and is not an average crop. Rowen is not over a one-fourth crop, and

fall feed mostly dried up. The usual amount of fall seeding has been done, though but few pieces have come up as yet. No fields of potatoes give more than half a crop and many fields are not worth digging. All late market-garden crops have been shortened by the drought. Before the gale the apple crop promised about 65 per cent, but more than half of them were blown off and are being used for feeding stock, making cider and evaporated apples. Pears, peaches and grapes are plenty, but were badly blown off by the gale of the 12th.

Monson (W. M. Tucker). — Indian corn is rather above an average crop and the fodder cured early. Rowen was a good crop on early cut, moist fields ; fall feed short. About the usual amount of fall seeding has been done, but it has been too dry for it to catch and start quickly. Potatoes are a fair crop, of good quality. Root crops, celery and other late market-garden crops are below the normal. Apples were a large crop, but were badly shaken off in some localities ; some were fed to stock ; cider makers will not take them until ripened. Pears, peaches, plums and grapes are plenty.

Palmer (O. P. Allen). — Corn is rather below an average crop. Rowen and fall feed are far below the usual average, owing to drought. The usual amount of fall seeding has not been done. The yield of potatoes is less than usual but the quality is fair. Root crops, celery and other late market-garden crops are not quite as good as usual. Apples were badly damaged by the gale and much of the crop shaken off will go into cider. Pears, peaches, plums and grapes were much lighter crops than usual.

WORCESTER COUNTY.

Dudley (J. J. Gilles). — Indian corn is a full average crop. Rowen and fall feed are far below the usual average. Scarcely any fall seeding has been done. Onions are not much grown. Potatoes are a light yield, of fine quality. Root crops, celery and other late market-garden crops are considerably below the normal. Two-thirds of the apples were blown from the trees, but there will be a fair crop of Baldwins and Russets.

North Brookfield (J. H. Lane). — Indian corn is an average crop. Rowen and fall feed are about 50 per cent of the usual average. Very little fall seeding has been done. Potatoes are about a three-fourths crop. The apple crop is big enough, though the average loss from the gale was 30 per cent ; many are leaving the windfalls on the ground, though some hope to sell them to cider makers. Pears 80 per cent ; no peaches ; plums 5 per cent ; grapes full crop ; cranberries 25 per cent.

Spencer (H. H. Kingsbury). — Indian corn has produced a large amount of fodder and a heavy yield of grain. Drought has cut short the rowen and fall feed. The weather has been very unfavorable for fall seeding and a less amount than usual has been done. Very few onions are raised, but they have done well. Potatoes are a light yield, with no blight or rot. The recent rains have improved the conditions for a good yield of late turnips, celery and cabbage. The gale shook off about one-fourth of the apples, which have been fed to stock and made into cider. There has been a large crop of pears, plums and grapes, and a few peaches.

Oakham (Jesse Allen). — Corn is a full average crop. There is very little rowen or fall feed. Less than the usual amount of fall seeding has been done and that in looks poorly. Potatoes are about a two-thirds crop. The prospect for root crops, celery and other late market-garden crops is fair. Apples are a great crop though many were blown from the trees; some of the windfalls have been fed out but many will not be gathered. Pears, plums and grapes are good crops of excellent quality.

Rutland (L. S. Dudley). — Indian corn is a good average crop. Rowen and fall feed are not up to the usual average. Less than the usual amount of fall seeding has been done and it is in rather poor condition. Onions are about an average crop. Potatoes are a short crop, of good quality. Root crops, celery and other late market-garden crops promise to be about average. The gale of the 12th blew off three-fourths of the apples, and the windfalls have been shipped to cider mills and fed out. Other fruits are about average crops.

Barre (J. L. Smith). — Corn is more than an average crop. Rowen and fall feed are not up to the usual average. Very little fall seeding has been done. Potatoes are of good quality, but not a very heavy yield. Apples were a very heavy crop, but the wind blew off a great many of the early winter varieties; Baldwins not badly blown off.

Fitchburg (Dr. Jabez Fisher). — Corn is better than an average crop. Rowen is very short, and fall feed is also, but the late rains will improve it. The apple crop is large and of good quality; from one-fourth to one-half were blown off the trees by the gale, a large portion of which went to waste. Pears have yielded a fair crop of smooth fruit; peaches a little uneven, but a fair crop; plums have done very well, as have also grapes. The sunny summer, together with the heat and drought, has developed an unusual amount of sugar in fruits, and will probably enhance their keeping qualities. Fruit buds for another year are prominent and abundant.

Lancaster (S. C. Damon). — Indian corn is a good crop. Rowen and fall feed are not half crops. The usual amount of fall seed-

ing has been done; seed sown four weeks ago is just coming up. Onions are small in size but numerous. Potatoes are not an average crop, owing to dry weather. The prospect for root crops, celery and other late market-garden crops is good considering the season. Sixty per cent of the apples were blown off and are still on the ground under the trees. Pears fair; peaches plenty; grapes very good; cranberries a small crop.

Bolton (H. E. Babcock). — Corn is a good crop, fully up to the normal. There is very little rowen and fall feed is short. About the average amount of fall seeding has been done, but it is late owing to drought. Onions are a normal crop. Potatoes are a light yield but of good quality. The prospect for root crops, celery and other late market-garden crops is good. Apples were a good crop; nearly or quite two-thirds blew off in the gale; but few have done anything with them, though some have been sold for cider. Other fruits are all above the normal.

Shrewsbury (T. F. Marston). — Indian corn is about a three-fourths crop. Rowen and fall feed are very light crops. The usual amount of fall seeding has been done, but it is not looking very well. Onions are not up in size. Potatoes are not a normal crop and some fields are not worth digging. Root crops are not up to the average and considerable celery has been burnt by drought. Apples are a very heavy crop; about one-half were blown off, which are being carried to cider mills. Pears were a heavy crop, but suffered considerable loss from wind; peaches, plums and grapes were a fair crop.

Westborough (B. W. Hero). — Corn is not more than two-thirds of an average crop. But little rowen has been cut and there is little fall feed. On account of the dry weather but little fall seeding has been done. Onions are a good yield, of excellent quality. There is about a two-thirds crop of potatoes, of medium quality. Root crops, celery and other late market-garden crops will be far below the average. Apples are of extra quality; one-half of the crop blown from the trees by the gale of the 12th; farmers feeding windfalls to cattle. Other fruits were about average.

Douglas (J. M. Rawson). — Indian corn is up to the average. Rowen and fall feed are not up to the usual average. More fall seeding than usual has been done, but it is not very promising as the weather has been too dry. Onions are about an average crop. Potatoes are not an average crop, but few fields giving satisfactory yields. If we have plenty of rain root crops, celery and other late market-garden crops will be good. Apples are not being picked as yet; the ground is pretty well covered with windfalls from the gale and they are decaying where they fell. Pears fair; peaches few; plums scarce; grapes plenty; not many cranberries.

MIDDLESEX COUNTY.

Hopkinton (W. V. Thompson). — Indian corn is about 80 per cent of an average crop. Rowen and fall feed are not up to the usual average. The usual amount of fall seeding has been done and it is just coming up. Potatoes are not more than a one-fourth crop. Root crops, celery and other late market-garden crops are short crops. Apples were a very heavy crop, but most of them were shaken from the trees by the gale and are on the ground. Pears good; peaches light; grapes good; cranberries good.

Marlborough (E. D. Howe). — Corn is about 85 per cent of a crop on the average farm. Rowen and fall feed are not up to the usual average. Very little fall seeding has been done yet except winter rye, which is just being sown and to fully the average extent. Potatoes are about 75 per cent in yield and 95 per cent in quality. Root crops, celery and late market-garden crops are about 10 per cent off in condition. The gale took from one-half to two-thirds the apples from the trees; some are fed to cattle, but most of them go into vinegar stock at 10 cents per barrel. Pears and peaches suffered severely in the gale; plums mostly gathered; grapes 90 per cent of a full crop; no cranberries grown.

Stow (G. W. Bradley). — Indian corn is not quite up to the average. Rowen and fall feed are almost failures. Not much seeding has been done as yet. Onions made a good yield. Some have a good average crop of potatoes, others not much of anything. Apples were a very large crop, but about half of them were blown off, and most of them are on the ground at the present time. Pears and peaches are very good; plums scarce; grapes and cranberries rather light.

Pepperell (P. J. Kemp). — Indian corn is about a two-thirds crop and did not ear very well. Rowen is about half a crop and fall feed is very short and thin. More than the usual amount of fall seeding was done because of the short hay crop, but very little of it has come up yet. Potatoes are below the normal in yield and above in quality. Root crops, celery and other late market-garden crops will be light. About half the apples were blown off and are lying on the ground where they fell. Pears a one-third crop; peaches a three-fourths crop; grapes half a crop.

Dunstable (A. J. Gilson). — Corn is a good average crop. Rowen and fall feed are below the usual average. The usual amount of fall seeding has been done and is in good condition. But few onions are raised, but they will compare well with a normal crop. Potatoes are below the normal in yield and quality. Root crops and late market-garden crops are not much raised, but are doing well. The apple crop is heavy, though the gale of the

12th shook one-half or more from the trees, the principal part of which will remain where they dropped. No pears; peaches a good crop; plums light; grapes and cranberries an average crop.

Tewksbury (G. E. Crosby). — Indian corn is a fairly good crop. Rowen and fall feed are not up to the usual average. There has been less seeding than usual done and it is not in good condition. Onions are a fairly good crop. Potatoes are a normal crop in quality, but not in yield. Root crops, celery and other late market-garden crops are somewhat under the average in condition. The gale thinned out the apples on the trees, but those remaining will be later and larger. The apples shaken off are mostly left on the ground, though a few have been sent to the cider mill. Other fruits are very light in this vicinity.

Bedford (Henry Wood). — Indian corn is not an average crop. Rowen and fall feed are not within 50 per cent of the usual crop. It has been too dry for fall seeding and a great deal of the early sown must be sown again. Onions are a very fair crop. Potatoes are a rather light crop but of fine quality. Root crops, celery and other late market-garden crops are looking well since the rains. About three-fourths of the apples were shaken off by the gale and are selling for 50 and 75 cents per barrel in the Boston market. There was a fair crop of pears; plums not plenty; grapes plenty.

Woburn (W. H. Bartlett). — Sweet corn is only a medium crop. Hardly any rowen has been cut. Less than the usual amount of fall seeding has been done, as the ground has been too dry. Onions are small, not over 75 per cent of an average crop. Potatoes are small and few, quality poor. Root crops promise fairly; celery looking well, less rust than usual; squash very light, failed to set any fruit. Apples are coloring; picking hardly commenced; small size; the gale blew off about two-thirds of them, which are rotting on the ground, as they are too green for cider and there is no sale for them at any price. Pears were a fair crop, but sold very low; peaches few; plums a good crop.

Stoneham (J. E. Wiley). — Rowen and fall feed are not up to the usual average. The usual amount of fall seeding has been done and it is in good condition. Onions are a three-fourths crop. Potatoes are about half a crop, of good quality. Root crops, celery and late market-garden crops are rather backward. The apple crop was good before the gale, but the wind stripped the Baldwin trees, though the Hubbardstons did not suffer much. Pears are a good crop and grapes a fine crop.

Weston (H. L. Brown). — Indian corn is an average crop as far as I have seen. Little rowen has been cut and fall feed has been very short but is growing now. Less than the usual amount of fall seeding has been done as none was done until after the rain.

Potatoes are less than half a crop, except on moist land. Roots are growing well; celery not grown for market here. Most of the apples were blown off in the gale; nothing or next to nothing has been done with the windfalls. Cranberries are not raised; the other small fruits have turned out well.

ESSEX COUNTY.

West Newbury (J. C. Tarleton). — Indian corn is an average crop and a large amount of it used for the silo. Rowen and fall feed are not up to the usual average. Very little fall seeding has been done, but that which is in looks fairly well. Potatoes are few and small. Root crops, celery and other late market-garden crops are up to the normal. Apples were abundant, but the wind blew over half of them from the trees; some are ground and fed out, others are used for cider. There was a great quantity of small fruits of extra fine quality.

Ipswich (O. C. Smith). — Corn has about an average stalk for fodder and grain is about 80 per cent of a normal crop. Very little rowen has been cut; pastures are improving. Not as much fall seeding as usual has been done, the drought has kept plowing back so that some are seeding this week, none up. Onions are a fair crop though little raised. Potatoes run small and give a light yield, but are of good quality. The prospect for root crops, celery and other late market-garden crops is good, as the late rains have benefited them all and they are still growing. The apple crop was very large; almost all the fall fruit and about one-third the winter fruit was blown off in the gale of the 12th; winter fruit left on the ground to ripen for cider. Other fruits were full average crops except grapes and plums.

Topsfield (B. P. Pike). — Indian corn is only a light crop this year. There was no rowen and there is not much fall feed. Hardly any fall seeding has been done and it is in poor shape at present. Onions are a light crop. Early potatoes were a light crop, late ones fair. Root crops, celery and other late market-garden crops are below the average. The gale blew off one-third of a very heavy crop of apples; some of the windfalls were made into cider, others are still on the ground. Pears were a fair crop; peaches good; plums good; no cranberries grown.

Manchester (John Baker). — Corn has done well. Rowen and fall feed are poor. The usual amount of fall seeding has been done and is in good condition. Onions are a good crop. Potatoes are a fair crop, of good quality. Apples are a good crop in spite of the gale, which shook off a great many; windfalls are largely

used for cider for vinegar making. All other fruits have turned out well.

Danvers (C. H. Preston). — Corn is less than an average crop. Rowen and fall feed are not up to the usual average. Less than the usual amount of fall seeding has been done and it is backward. Onions are less than an average crop. Potatoes are a normal crop in yield and quality. Apples were a large crop, but two-thirds to three-fourths of them were blown off in the gale of the 12th; nothing has been done with the windfalls as yet. Pears average; peaches good; grapes good; plums a small crop.

NORFOLK COUNTY.

Stoughton (C. F. Curtis). — Indian corn is about 70 per cent of an average crop. On low land there is a fair crop of rowen, but only on low land. The average amount of fall seeding has been done and the present condition is good. Potatoes are of good quality, but the yield is not over 60 per cent of the normal. The apple crop turned out much better than I thought possible, but the gale blew two-thirds of the fruit from the trees, and the windfalls will go into cider. All other fruits turned out very fair crops for this section.

Canton (E. V. Kinsley). — Corn is a full average crop. There is very little rowen and no fall feed. About the usual amount of fall seeding has been done and many fields are showing green since the rains. Potatoes are below the average in yield; quality excellent; no rot reported. Root crops, celery and other late market-garden crops are light crops, of medium quality. Apples are not picked, about one-third remaining on the trees since the gale of the 12th; quality good; windfalls mostly sent to cider mills; thousands of bushels at the mills in this vicinity, no sale at present. Pears a full crop, quality good; other fruits mentioned good crops; cranberries light. Milk supply short and talk of higher prices than for last winter.

Norwood (Hon. F. A. Fales). — Indian corn is 80 per cent of a full crop. Rowen and fall feed are up to the usual average. Not more than a quarter of the usual amount of fall seeding has been done, owing to the dry weather. Onions are about a three-fourths crop. Potatoes are about half a normal crop. Root crops, celery and other late market-garden crops are in very good condition. Apples are a fair crop; windfalls made into cider. Other fruits have been average crops.

Medfield (Geo. R. Chase). — Indian corn is a three-fourths crop. Rowen and fall feed are not up to the usual average. The

usual amount of fall seeding has been done and it is in fair condition. Potatoes are less than a normal crop. The apples blown from the trees by the gale of the 12th cannot be disposed of. Pears, peaches, plums and grapes have turned out well.

Norfolk (Geo. E. Holbrook). — About an average crop of corn was raised. Rowen and fall feed are not over 50 per cent of the average in condition. Very little fall seeding has been done. Onions are a good crop. Potatoes are not over half a crop and the tubers are small. Fifty per cent of the apple crop was lost by the gale, and the windfalls are only used for feeding stock.

Foxborough (E. A. Morse). — Corn is an average crop. Rowen and fall feed are not over one-fourth of the usual average. Very little fall seeding has been done, but farmers are seeding since the rains. Potatoes are not more than half a crop, of fine qualitys Apples were a large crop; the gale took half of them, and most of the windfalls are being made into cider. Pears are a full crop; plums the same; grapes very few; cranberries about a two-thirds crop.

BRISTOL COUNTY.

Mansfield (Wm. C. Winter) — Corn is so much damaged by the gale that it is impossible to give the result, but it would have been about normal but for that. Pastures are very poor and there is no rowen worth mentioniug. Very little fall seeding has been done and that looks very poorly. Potatoes are somewhat below the average in yield but of good quality. Root crops, celery and cabbages are very poor. Fall apples have been plenty; winter apples about one-third crop, gale shaking off 50 per cent of them; windfalls generally left on the ground, though some are used for cider for vinegar. Three-fourths of the pears were lost in the gale; peaches and plums poor; grapes fair.

Easton (H. M. Thompson). — Indian corn is not quite an average crop, owing to the extreme drought. Rowen on low land is an average crop, but on uplands was not worth cutting. Fall seeding is late, owing to the disposition of farmers to wait for more moisture in the ground. Onions are a fair crop. Potatoes are not quite up to the average in yield. The prospect for root crops, celery and other late market-garden crops is not very encouraging. The apple crop promised well, but during the dry spell many dropped from the trees and the gale did the rest; cider is being made from the windfalls, only a few being gathered for eating and marketing purposes. Pears, plums and grapes bore abundantly; peaches and cranberries were lighter.

Seekonk (Fred A. Howe). — Corn is fully an average crop. Rowen and fall feed are not up to the usual average. Not as

much fall seeding was done as usual, owing to dry weather, and it is very backward. Onions are not as good a crop as common. Potatoes are about half a crop, of very good quality. The prospect for late market-garden crops is very poor, except for celery, which looks very well. Apples were a very good crop; the gale blew off fully two-thirds of them and they are still lying on the ground. Pears and grapes are very good; other fruits poor.

Dighton (J. N. Paul). — Indian corn is an average crop and is about ready to harvest. There was very little rowen and fall feed is light. Less than the usual amount of fall seeding has been done and it is not in good condition. Onions are less than half a crop; quality poor, size small. Potatoes are about half a crop, of good quality. Root crops poor; celery very poor; late market-garden crops very poor. Apples were blown from the trees very badly, not over 25 per cent being left on the trees; those blown off have been sold as windfalls and made into cider. Pears good; peaches good; plums poor; grapes good; cranberries poor. Strawberry beds have made a poor stand and the prospect for another year is not good.

Dartmouth (L. T. Davis). — Corn is about 80 per cent of a full crop in this section. Rowen and fall feed are far below the usual average. There has been no seeding of any amount, as it has been too dry up to within a few days. Onions are far below a normal crop, mostly not over half a crop. Potatoes are not much over half a crop. Root crops, celery and late market-garden crops are far below the average. Apple picking is not yet complete; the gale in many cases blew off the larger half; some windfalls going for cider and some used for feeding. Pears fair; peaches light; plums fair; grapes good.

PLYMOUTH COUNTY.

West Bridgewater (C. P. Howard). — Corn is about a three-fourths crop. Very little rowen has been cut. Less than the usual amount of fall seeding has been done. The onion crop was injured by the drought. Potatoes are about half a crop. Root crops, celery and other late market-garden crops started late. Apple trees were heavily laden, but many orchards were nearly stripped on the 12th and the windfalls are not worth gathering. Pears seem to be plenty and grapes are very plenty.

Hanover (H. L. House). — Indian corn is fully up to the average. There is very little rowen or fall feed, on account of the dry weather. Very little seeding has been done, owing to the drought. Potatoes are a small crop, of excellent quality. Root crops, celery and other late market-garden crops were all damaged by dry

weather. There was a heavy crop of apples, of good quality, but the gale destroyed it; people are making cider of the fallen fruit. Pears good; peaches fair; plums good; grapes poor; cranberries about a two-thirds crop.

Hanson (F. S. Thomas). — Indian corn is an average crop. There is little rowen but fall feed is good. The usual amount of fall seeding has been done and it is in good condition. Onions are a normal crop. Potatoes are a small crop, of good quality. Apples are good but small; many were shaken from the trees by the gale of the 12th, but in many cases there are plenty left; some are making cider of the windfalls, some are drying part of them and many are doing nothing with them. Other fruits were good crops.

Pembroke (Nathaniel Morton). — Indian corn is about an average crop. Rowen and fall feed are far below the usual average, owing to dry weather. Less than the usual amount of fall seeding has been done. Onions are not an average crop. Potatoes are poor in yield but of good quality. Root crops, celery and other late market-garden crops are below the average. The apple crop is abundant; the gale shook off one-half, which will be of little value because immature. Pears are abundant; plums and grapes average; cranberries about half a crop.

Lakeville (N. G. Staples). — Corn is about a three-fourths crop. Rowen and fall feed are up to the usual average. About the usual amount of fall seeding has been done but it is very late. Onions are half a crop. Potatoes are not half a crop as to yield but are of good quality. Root crops, celery and other late market-garden crops will be short. There was a good crop of apples, but the gale blew off three-fourths of them and the windfalls are not worth picking up. Pears, peaches, plums, grapes and cranberries were all short crops.

BARNSTABLE COUNTY.

Bourne (D. D. Nye). — Indian corn is not an average crop. Rowen and fall feed are not up to the usual average. Less than the usual amount of fall seeding has been done. Scarcely any onions are raised in this town. In some localities potatoes have done well, in others they are a failure. The prospect for root crops, celery and other late market-garden crops is very poor. Apples were a very good crop until the gale of the 12th; the windfalls are mostly fed to stock, though some of them are dried. Pears, grapes and cranberries are very fair crops; peaches and plums scarce.

Falmouth (D. R. Wicks). — Corn is nearer an average crop than any other. There is very little rowen; fall feed looks better since

the rains. No fall seeding has been done about here. Onions are about half a crop. Potatoes are half a crop in yield but of good quality. The prospect for root crops, celery and other late market-garden crops is very poor. There was a good crop of apples before the gale blew them off; two-thirds of them are now on the ground and are being made into cider for vinegar. Pears, plums and grapes are full crops; peaches and cranberries half crops.

Dennis (Joshua Crowell). — Indian corn is not over a three-fourths crop. Rowen and fall feed are much below the usual average. Very little fall seeding has been done. Onions are about half a crop. Potatoes are not more than half a crop, of fair quality. Root crops, celery and other late market-garden crops do not promise to be more than from half to three-fourths crops. Nearly all the apples were shaken off by the gale of the 12th. There are fairly good crops of pears and grapes; cranberries about 30 per cent of an average crop.

Orleans (F. E. Snow). — Corn is much injured by dry weather. Rowen and fall feed are very short. Potatoes are not a normal crop, being cut short by drought in most cases. The apple crop here was abundant before the gale; since then some have been sold in neighboring towns. Pears abundant and good; cranberries hardly an average crop, except in a few bogs; other fruits little raised.

DUKES COUNTY.

West Tisbury (Geo. Hunt Luce). — Indian corn is below the average crop. There is no rowen and fall feed is very poor. Some fall seeding has been done, but it is very late on account of drought. Potatoes are below the average in yield but of good quality. Root crops, celery and other late market-garden crops promise poorly. The apple crop was large, but the gale blew off a great many; in some cases cider is made or drying done, but most of them lie on the ground. Pears, peaches, plums and grapes are very good crops.

NANTUCKET COUNTY.

Nantucket (C. W. Gardner). — Indian corn is about a two-thirds crop. Rowen and fall feed are all dried up. No fall seeding has been done as yet. Onions are not more than half a crop. Potatoes are hardly a one-third crop. Root crops, celery and other late market-garden crops promise well. There are no cranberries. Much salt hay is cut to help carry the stock through the winter.

BULLETIN OF

MASSACHUSETTS BOARD OF AGRICULTURE.

THE RELATION OF AGRICULTURE TO THE PUBLIC HEALTH.

By Dr. SAMUEL W. ABBOTT, *Secretary Massachusetts State Board of Health.*

In the study of man as a social being nothing is more evident than the fact that his comfort, his happiness, his health, almost his very existence, depend largely on his relation to his fellowmen. Robinson Crusoe had his man Friday; the hermit and the monk are more or less dependent on the outer world, notwithstanding any vow they may have made to lead a separate, isolated life. The philosopher Thoreau said, "I never found the companion that was so companionable as solitude. . . . It would be better if there were but one inhabitant to a square mile, as where I live," but even Thoreau, after living for two years as a hermit, found it best to return to civilized life again.

If this is true individually, it is true collectively. The great industrial classes—artisans, mechanics, laborers, teachers, professional men, sailors, fishermen, clerks and farmers — are all interdependent upon each other.

So, in the human body, every member makes every other member more useful, and each one increases the efficiency of all. The two eyes make the one pair of hands more useful than a dozen pair without eyes. Sir Charles Bell, in his "Essay on the Human Hand," shows that the thumb makes the four fingers more serviceable than a score of fingers without the thumb. "On the length, strength, free lateral motion and perfect mobility of the thumb depends the power of the human hand."

In the treatment of the subject, "The relation of agriculture to the public health", I shall deal with the question from different stand-points; first, in a subjective manner, that is to say, the effect of the occupation o agriculture upon the farmer himself, and upon his family; second, the relation of the occupation of farming or agriculture to the health of the community; and finally, in a more general way, by a comparison of these two general branches with each other.

What is the effect of the occupation of agriculture upon those who have chosen this occupation? And how may their condition be improved?

Of all the occupations, trades and professions in which mankind are employed, that of farming is, with one exception, the most healthful, and the most conducive to long life. I do not need to add that it is also the oldest of all industries, the most natural and the most important to the physical welfare of man. Let us imagine, for a moment, that the work of raising crops, milk products, fruit, cattle and other food animals were to cease entirely for a period of one year, and contemplate the effect of such an event. The cessation of any other industry which can be named could not produce so disastrous an effect upon the human race.

Let us examine this question of the healthfulness of agriculture as a profession or occupation more closely, with reference to the reasons.

In general it may be said that out-door occupations are more healthful and conducive to length of life than in-door industries. In order to successfully till the soil, to raise crops and tend cattle and other animals, the farmer must necessarily lead an out-door life, as compared, for example, with mill operatives, shoemakers, book-keepers and other in-door occupations. Those occupations in which large numbers of people are employed together are unhealthful in proportion to the numbers crowded together in a given space. They are also unhealthful with reference to the character of the occupation in which they are employed. Occupations which produce irritating dust, like stone cutting, knife grinding, rag sorting, etc., tend to shorten the lives of workmen and produce consumption, while persons who live largely in the open air, like farmers and fishermen, escape such noxious influences.

The accompanying table presents some of these facts in a more definite manner: —

*Comparative Mortality of Men in Different Occupations in England.**

Clergymen,	100	Printers,	193
Farmers,	114	Cotton manufacture,	196
Paper makers,	129	Physicians,	202
Grocers,	139	Stone quarriers,	202
Fishermen,	143	Bookbinders,	210
Carpenters,	148	Butchers,	211
Lawyers,	152	Glassworkers,	214
Shoemakers,	166	Plumbers and painters,	216
Commercial travellers,	171	Cutlers and seissors makers,	229
Bakers,	172	Brewers,	245
Masons and bricklayers,	174	Liquor dealers,	274
Blacksmiths,	175	File makers,	300
Railway laborers,	185	Earthenware makers,	314
Woollen manufacture,	186	Hotel service,	397
Tailors,	189		

The foregoing table may be read as follows: assuming the mortality of clergymen as a standard, that of farmers is 14 per cent greater, that of lawyers 52 per cent greater, etc.

* From paper by Dr. Wm. Ogle, at International Congress of Hygiene at London, in 1891. Section on Demography.

Another circumstance conducive to the health and long life of the farmer is the fact that, generally speaking, his food supply is more liberal and more varied than that of persons following other occupations, since he is the producer of the sustenance of the people, and therefore of his own. A good and sufficient food supply is essential to the well-being of every one. It is not only necessary that the supply of food should be abundant but also that it should be well selected, sufficiently variable in character and of good quality. And these conditions are usually found to exist to a greater degree in the house of the farmer than elsewhere.

Again, the inherent character of the occupation makes it a promotor of health and longevity. The succession of crops, depending as they do upon the regularly recurring seasons of the year, occurs with harmonious regularity. If there is anything poetic, anything uplifting, anything tranquillizing in nature, who is the first and the most likely to receive these inspiring impressions if not the agriculturist? The rush, the hurry, the anxiety, the worry of the business man, the financier, the politician, the soul and body destroying conditions which surround the devotee of fashion, do not affect him. Undoubtedly he has his trials and perplexities, but, all combined, they cannot counterbalance or offset the general good influence of his occupation.

The average life of the lawyer, the physician, the mechanic, the soldier, the laborer, is in either case shorter than that of the farmer. So far as the medical profession is concerned there is the constant and wearing influence of the sight of human beings suffering with pain and sickness, of witnessing death-bed scenes, of broken rest at night and of direct exposure to infectious diseases. I have often been asked the question "Why do not doctors take or contract contagious diseases?" I answer that the assumption is entirely wrong at the outset. Physicians do take infectious diseases, and die with them in a greater ratio than the general population, and the same is true of nurses, hospital attendants and all others whose duty it is to wait upon the sick.

Country life in general is more healthful than city life. The death-rate of the country is almost always less than that of the city. It is the constant stream of humanity that is always flowing from the country toward the city that keeps the city alive. The vigorous health of those who dwell upon the farms is in strong contrast to the weaklings who are produced by thousands amidst the densely crowded quarters of our large cities.

It was the Germans, the Goths and the Vandals, fresh from the fields and farms of northern and middle Europe, that finally prevailed over the Roman people, who had become enervated by the licentiousness, the excesses and debasing habits of city life. John Burroughs says, in contrasting the farmer and the dweller in cities, "A nation always begins to rot first in its great cities, is, indeed, always rotting there, and is saved only by the antiseptic virtues of fresh supplies of country blood," and again he says, "The farmer has the most sane and natural occupation, and ought to find life sweeter, if less highly seasoned, than any other. He alone, strictly speaking, has a home. How can a man take

root and thrive without land. He writes his history upon the field. How many ties, how many resources, he has; his friendships with his cattle, his team, his dog, his trees, the satisfaction in his growing crops, in his improved fields; his intimacy with nature, with bird and beast, and with the quickening elemental forces; his co-operations with the cloud, the sun, the seasons, heat, wind, rain and frost. Nothing will take the social distempers, which the city and artificial life breed, out of a man, like direct and loving contact with the soil. It draws out the poison. It humbles him, teaches him patience and reverence, and restores the proper tone to his system."

It is the out-door life, the keen observation of the every-day events of the farm and the forest, the watchful eye and ear, the minute observation of birds and their habits, of the squirrel, the rabbit, the weasel, the ferret, the fox, the muskrat, and the woodchuck, of the multitudes of different kinds of insects both useful and injurious, that have given us such books as have been written by Gilbert White and Thoreau and John Burroughs and Bradford Torrey and Seton Thompson, — books that every observing farmer ought to have in his library to read in the long winter evenings.

But there are exceptions to every rule. I have said that the farmer is, with one exception, the longest-lived man. Were it not for certain circumstances he would lead the list. How then may his condition be improved? I shall now direct your attention to a few of the points wherein improvement may be made.

And first, since I have spoken of the value of fresh *out-door* air in promoting health and long life, I will add to this that fresh *in-door* air is quite as important to those who live in the house, and especially is this true of the sleeping-rooms. Too often does it happen in the modern farm-house that the sleeping-rooms are too small, and are also wanting in the proper means of *ventilation.* Ventilation means the change of the foul air of the in-door apartment, and its renewal by fresh air from out doors. This cannot be done in a sleeping-room in which the windows and doors are tightly closed, unless special provision is made for renewing the air by means of an out-door opening, such as may be furnished by an open fire-place or grate; and even a grate is not a sufficient means of ventilation, so long as there is no fire in it. A man who lives in this manner year after year, breathing the foul air of a tightly closed sleeping-room, cannot continue in good health. The actual cost of maintaining a house with good ventilation is somewhat greater than that of a house with no ventilation at all, since a greater amount of fuel is required for a well-ventilated house than is necessary for a house with no ventilation.

The Water Supply. — If pure air is essential to good health so is pure water. From my own observation of very many farms which I have visited and inspected, I should say that the water supply of farms is, on the whole, better than that of thickly settled villages in which the domestic water supply is drawn entirely from private wells. There are, however, abundant instances of badly polluted water supplies among the farms of Massachusetts, and when such farms are also

dairies, producing milk for the supply of large populations, the polluted water supply becomes a serious danger and a menace to the public health.

I shall allude to this phase of the subject more at length in another connection.

The peculiar regard which each householder or house owner has for his own well is sometimes marvellous when a single glance at its surroundings would convince even a casual observer that the owner's estimate is far from correct. The water looks clear and transparent; it has a sparkling taste; very likely the owner prefers it to any other water in the world. But clear and good tasting water is not necessarily pure water, and may be exceedingly polluted, as an ordinary chemical analysis often shows. It is necessary, therefore, in locating a well, to place it in such a position that no foul drainage from any source can possibly enter it, either by filtration through the ground or by surface flow over the ground. The cow yard, the back yard of the house, the barn cellar, the house cellar, the neighborhood of the hogsty and the cesspool, neither of these places is suited for the site of the well. As a general rule it would be preferable to place the well above the house and barn, in higher rather than in lower ground, unless some neighbor's house, and consequently his drainage system or want of system, happens to be on still higher ground above the well. In hilly and mountainous regions it is a common and an excellent practice to draw the water for the farm from a spring at an elevation on the mountain side, above the house and away from all possibility of contamination.

In connecting such springs with the house there is, however, an element of danger which deserves a moment's notice. I refer to the use of lead pipe. Under certain conditions and with certain waters lead pipe is used continuously and without harm; but this is not always the case. It is only quite recently that I have investigated a serious epidemic of lead poisoning in a small village furnished with a public water supply where some thirty or forty people were poisoned with lead and some of them quite seriously. In all these cases of poisoning I found that unusually long lines of lead pipe were used to connect the houses with the street mains. I also found that little care had been taken to draw off the water which had stood in the pipe over night before using it in the morning. With this precaution the danger is greatly diminished. It is much safer, however, to use no lead pipe at all. Iron is entirely safe and the added cost of occasional renewal of the pipes does not impose a serious tax upon the house holder.

Drainage. — Having considered the water which enters the house, let us now spend a few moments upon another and a similar question, the water which goes out of the house, that is to say, the drainage or sewage of the house; in other words, the water which has entered the house with the addition of such refuse as the household may add to it. The location of farm-houses at a distance from densely settled communities usually prevents their connection with public systems of sewerage. Hence it becomes necessary to take care of the house drainage upon the farm itself.

A repulsive pool of foul-smelling sewage near the back door of the farm-house or under the windows of sleeping-rooms is not a pleasing or a healthful ornament to the homestead. If a cess-pool is used to receive the sewage it should be so constructed that no foul odors from it can escape into the house, and this can best be done by a perfect trap between the cess-pool and the house. The ordinary bell trap at the sink is not a sufficient safeguard. Another plan is to dispose of the drainage into small subsoil pipes loosely laid, so that the contents may pass outward into the soil, to be used by the growing crops.

Food. — Another important element which influences the health of the farmer is his food. Several years ago the State Board of Health made an investigation in regard to the food of the people of Massachusetts, very much of which related to the food of farmers I will quote the most important of the conclusions which they published at that time.

1. Good bread is scarce, and is too often made with some unwholesome substitute for yeast.
2. There is too little variety in food.
3. Meat is too often fried.
4. Pastry and cakes are used to an injurious extent.
5. Too little time is allotted for meals.

The quality of the beverages taken with meals is a matter of no little importance. Coffee, tea and cocoa form a useful addition to meals when they are not taken in excess. Intoxicating drinks should be banished forever from every farmer's table, since no man can tell when he has passed the danger line in their use, so far as the effect upon his health is concerned.

There are certain curious fallacies in regard to the use of food, beverages and drugs which are worthy of a moment's consideration. One of these is the popular belief, which has prevailed for many years, which attributes to phosphorus and its compounds in food an unusual importance in promoting the growth of the brain and of the intellectual powers. Hence much stress is given to the eating of fish, and the use of acid phosphates as beverages. That this curious theory has little foundation, however, is pretty well proven by the following facts:

1. There is no evidence to show that the brain requires phosphorus more than the bones or other organs of the body.
2. Fish contain no more phosphorus than other kinds of animal food, and the unbolted cereals, wheat, oatmeal, rye and Indian corn.
3. People who are most accustomed to a fish diet, *i.e.*, fishermen (the natives of Cape Cod and of fishing ports generally), do not give evidence of possessing unusual intellectual powers.

A young writer once sent a communication to Mark Twain asking his opinion as to the use of fish as a food for developing the brain, at the same time suggesting that Professor Agassiz had recommended the eating of fish for that purpose. He replied, "Yes, Agassiz *does* recommend authors to eat fish, because the phosphorus in fish makes brains. So far, you are correct. But I cannot help you to a decision about the amount you need to eat. If the specimen composition you send is about

your fair, usual average, I should judge that perhaps a couple of whales would be all you would want for the present. Not the largest kind, but simply good, middling sized whales."

Another source of harm exists in the excessive use of patent medicines. Under the false impression that some sort of drug must be taken in the spring to "purify the blood," to cure a "tired feeling," to "make the weak strong," pounds of iodide of potash are taken under the false name of sarsaparilla, of saltpetre under the name of kidney cures, of alcohol under the name of celery compound, nervura and so on. All of these preparations are injurious and are constantly undermining the health of the victims who are continually dosing themselves with them.

Recreation. — The kind of recreation most needed by any man depends very much upon the character of his occupation. To the farmer, who has held the plough all day long in spring time, or swung the scythe in midsummer, or cut and piled several cords of wood in winter, it would be superfluous advice to tell him to spend an hour or two a day in rowing or in kicking foot-ball by way of exercise at the close of the day. Exercise to his weary limbs would not be restful. These are the kinds of recreation which are most useful for the clerk and the book-keeper, whose life is mainly sedentary and confined within closed apartments. On the contrary, the farmer needs a milder pastime, that will be at once restful and an absolute change from his hitherto toilsome labor. Fishing, sailing or some sort of in-door games will divert his mind from the toils of the farm and give needed rest.

I call to mind a man who, in my boyhood, passed my father's door every day with a cart or wheelbarrow on his way to his farm, which was at some distance from his residence. He worked hard, early and late, and accumulated a handsome property for those days. He worked on, day after day, doing the work of two men and more without rest or relaxation of any sort. So hard did he work that fits of sleeplessness and despondency ensued, and finally one day, on returning from the village school opposite my father's house, my mother called me to her and said, "Mr. B. is dead; he has killed himself." He was then fifty years of age and died of incessant work.

Good reading constitutes another excellent form of recreation for the farmer, and no farmer's household should be without at least the means of access to a good library, and to this should be added a subscription to some good farm journal, with such other periodicals as his means may permit. These are forms of mental recreation, to be sure, but the harmonious development of the mind and body are essential to good health and contentment.

I come now to the second topic, the influence of agriculture upon the public health. It may be inferred from what I have already said that, without agriculture, there would be no such thing as public health, since man would cease to exist. Hence agriculture is, of all things, one of the most essential to the public health. It produces the sustenance wherewith man is supported and his life maintained. The phase of the subject, therefore, to which I shall now call your attention is the method by which this influence upon public health can be maintained in

its highest perfection; since there are certain ways in which the farm occasionally, and through some neglect of due precautions, becomes a source of danger.

The diseases to which man is subject are several in number, but those which are of the greatest interest to us in this connection are very few. Some of them are common both to man and to animals, and some are not. Those which are of peculiar interest to the farmer, and which occasionally cause him more or less anxiety, as well as pecuniary loss, are tuberculosis or consumption, typhoid fever, trichinosis, glanders, rabies, and anthrax, or malignant pustule. Of these diseases the cow is subject to one or more, the horse to another, the hog to another, the sheep and horse and cow to another, the dog to another, and man to all of them. But all except the first two which I have named are of such rare occurrence in man in this State as to be scarcely worthy of mention as causing any serious harm to our living population. All told they produced only one-thousandth part of the number of deaths which were caused by consumption in the last fifty years in Massachusetts.

The question whether tuberculosis in the cow is the cause of the same disease among men, in consequence of the eating of meat and the drinking of milk from such animals, has been a live issue for several years past, but definite and decisive evidence as to the exact relation of the disease in the cow to that in man still appears to be wanting.

So long, however, as there appears to be a doubt in the matter, it is assuredly the safer course to use only such meat and milk, and especially milk, as comes from healthy animals.

In the case of typhoid fever a very different question arises. Here we find a disease which never occurs in the cow, but is peculiar to man only. Unfortunately it is of too common occurrence in the farming districts, and is due most commonly to a polluted water supply. When it occurs upon a dairy farm, it occasionally causes serious disturbance on account of its liability to infect the milk supply. Hence it should be laid down as a rule that *no person who is ill with any disease whatever*, and especially with any infectious disease, should be allowed to have any part in the work of a dairy. Another important point is the care which should be taken in disposing of the discharges of persons who are ill with typhoid fever. Thorough disinfection of such discharges should be made with chloride of lime. A man who is only slightly ill with typhoid fever, and able to attend to farm work (and such cases are quite common), is far more dangerous than one who is sick in bed, since the latter can have no direct connection with the milk supply.

In order to consider the operation of such cases, let us suppose a case. An epidemic of typhoid fever is found to exist in a city of twenty-five thousand people. Twenty cases or more of typhoid fever are reported to the city board of health. There are fifty milkmen who supply the city with milk from the neighboring towns. All of these cases of typhoid fever, or nearly all, are customers of one milkman. This circumstance directs the attention of the board of health to this milk route, and, on further investigation, a case of typhoid fever is found to exist at the dairy where the milk is produced, and a careless method of handling

the milk is also found to exist. I need not specify the circumstances which are often found to exist in actual experience. The existence of these facts is in most instances sufficient to establish a presumptive connection at least between the typhoid fever at the dairy and that which exists on the route of the distributer.

Within the past ten years I have been called to investigate several outbreaks of another disease, — trichinosis, — which is not very common among the native New England population. It is always and invariably due to one cause, — the eating of pork, and also of uncooked or insufficiently cooked pork. Fifty cases and five deaths occurred from this cause in the town of Colrain in Franklin County a few years since, all among Germans or other European immigrants, and all were due to eating raw pork. The disease in the hog is caused by bad methods of feeding, and it usually exists in a very considerable percentage of hogs which are swill fed. The State Board of Health, during the past few years, has conducted experiments at two State institutions which show that the disease may be entirely prevented in the hog by cooking his food, and by ceasing to feed out the entrails of slaughtered hogs.

I have said enough in this direction to establish two important principles in regard to farm and dairy work; first, the necessity of absolute cleanliness in every department of work, and second, the rule which I have already stated, that no person who is ailing or even slightly ill with any infectious disease should be permitted to have any part in dairy work until such person has entirely recovered and has been pronounced well by the attending physician. If these rules are followed, the milk producer will have less occasion to complain of frequent loss in the sale of this most useful article of food.

A great stir has been made in Europe in recent years with the object of preventing the importation of certain fruits, the products of American farms. The reasons alleged, chiefly by the German government, were that poisonous insecticides were used for the spraying of fruit trees in the United States. Another reason alleged was that zinc had been found in dried fruits. This statement rests upon the fact that apples and peaches and other fruits are often evaporated or dried upon zinc trays, and hence small amounts of metallic zinc are occasionally found in the fruit. The amount, however, is so small and the form in which the zinc is found is such that no harm need be feared from this source.

The practice of spraying fruit trees in the season of blossoming and for a few days afterward has become widespread, and demands a moment's notice. The substances used for this purpose are, some of them at least, deadly poisons. Arsenic in the form of Paris green and London purple, with sulphate of copper or blue vitriol, are employed for this purpose, and these make the most efficient means for destroying the various insect pests which attack our fruit trees, currant bushes, potato vines and other plants.

In the case of fruit trees like the apple, the principal insect pests are the American tent caterpillar and the canker worm, each of which usually hatches and begins and completes its destructive work between May 10 and June 20. Now, the season of harvest for the great volume

of the apple crop is about October first, and probably none which are raised for export are gathered before September first. There is, therefore, a period of from two to three months in which the average rainfall is about three inches per month, a quantity amply sufficient to wash away all traces of the spraying substances from the fruit and the leaves.

In the summer of 1896 I made the following experiment. Having built a small platform in the crotch of a large old apple tree, about fifteen feet from the ground, I took a two-gallon pailful of Paris green mixture up to the platform about three times a week and sprayed the whole tree from this platform, alternating occasionally with a solution of sulphate of copper. At least half of the sprayings were of Paris green. This mixture was so strong as to destroy some of the smaller branches near the centre of the tree The sprayings were continued till at least a dozen doses had been applied between May 15 and June 15 and the canker worms were pretty thoroughly destroyed. A good crop of unusually fair apples began to appear, and were of three kinds, Dutch codlings, Gravensteins and Danvers sweets. The early apples were picked about September 5 and the late sweets about October 5 or later. Several of these were selected, of two kinds, together with some of the leaves, and were submitted to the State chemist for analysis, and he reported that not the slightest trace of either arsenic or copper could be found in them.

It should, however, be borne in mind that Paris green is a deadly poison, and when used on the farm, either for destroying the pests of fruit trees or potatoes or even larger vermin, like rats and mice, the greatest care should be taken to put the supply of poison out of the reach of children and of animals.

In what points do these general branches, agriculture and public health, resemble each other?

In point of usefulness to the community, agriculture and public health have a great deal in common. Agriculture provides the means wherewith life is sustained, the sustenance essential to the continuance of the human race. Nine-tenths of all the food used throughout the world is the product of agriculture. How essential it is, therefore, that this most useful branch should be developed in the most thorough manner and maintained in the most perfect degree.

As it is true that agriculture maintains life, it is also true that public health or hygiene protects life. Although the term preventive medicine is of comparatively recent origin, the practical application of the science is by no means new. Moses applied it many centuries ago in the preventive treatment of leprosy and in the management of camp life. In the Middle Ages nineteen thousand lazarettos were necessary to provide shelter in continental Europe for the outcasts from this disease. Dr. Jenner applied it when he introduced the practice of vaccination for the prevention of small-pox, a hundred years ago. But it is only within the past half century that systematic and careful study and attention have been given to public hygiene, with the view of training young men in the science of preventive medicine or the art of prolonging life. It is a fact capable of easy demonstration that, since careful attention has

been given to the subject of preventing the spread of infectious diseases by means of notification, isolation, disinfection and vaccination, and still more recent methods of treatment and prevention by means of the taking of cultures and the use of antitoxin, the death-rate from infectious diseases has been sensibly diminished, and the length of human life correspondingly prolonged, and this is notably true of England, the country where the most careful attention has been given to the subject and the greatest amount of money expended in its accomplishment.

Public hygiene or preventive medicine again is like agriculture in its method of dealing with those evils which, on the one hand, destroy human beings and limit their progress, and on the other, those which seriously interfere with the abundance and the quality of growing crops, and the principles of prevention which are applied in either case are very much alike.

If a sound, healthy infant, born of healthy parents, were to be placed in a glass case, and fed with pure food which had been freed from all germs of disease by due process of sterilization, and were constantly supplied with pure air which had also been sterilized; if the water which it drank were to be always pure spring water, and if in all other points it were to be treated on perfectly healthful principles, such an infant would never die of measles nor small-pox nor scarlet fever nor typhoid fever nor whooping cough nor consumption.

So, also, in agriculture, if an apple tree or a peach tree were to be enclosed in a glass case, where it would be supplied with abundance of sunlight, with filtered water and sterilized air and soil deprived of all pathogenic germs or eggs of noxious insects. No canker worm nor caterpillar nor gypsy moth nor any other pest could possibly molest it, and its leaves and flowers and fruit would mature and ripen in fairness and beauty. This is the principle of isolation.

There is also a great similarity in the methods of spread of infectious diseases and of insect pests, and while there is a similarity in the general group of infectious diseases to that of insect pests, there are also many points of specific difference.

Influenza, for example, spreads with amazing rapidity and attacks great tracts of country in a few hours' time. It appeared in Boston about Dec. 19, 1889, and in less than a week had also appeared in nearly every city of the northern States. One class of diseases, cholera and typhoid fever, spreads through the medium of water supplies, another class, including small-pox and scarlet fever, by means of the air and by actual contact. The spread of consumption is favored by the presence of dust diffused through the air of rooms and carrying with it the germs of disease.

So, too, in agriculture, the various insect pests differ in the method of their spread. The female canker worm ascends the trunks of trees in the warm days of late autumn or early spring and lays her eggs on the twigs, to be hatched in the months of May or June. Hence the mode of prevention is to place a barrier upon the trunks of the trees which shall hinder the insects from gaining access to the branches. So with the American tent caterpillar. This insect lays its eggs upon the small

outer twigs of the trees in bunches of several hundred eggs in each, carefully varnishing the bunches to protect them from the weather. Destruction of these bunches or belts of eggs, or of the young caterpillars as soon as they are hatched, is the only practical mode of dealing with them.

Again, the same substances which destroy noxious insects are also used in medicine as disinfectants, and the careful study of their action will advance the cause of agriculture. The farmer who carefully applies the right form of insecticide to his potato vines during the growing season will insure the best crop. So, also, with his fruit trees; a careful application of spraying liquid of such strength as not to injure the trees, but strong enough to destroy the insect pests, will insure the best crop of fair and handsome fruit.

So the health officer who applies disinfectants judiciously and intelligently will be rewarded in finding that scarlet fever, diphtheria and other pests of mankind will not recur in the same household unless introduced from outside sources.

I cannot close this comparison without reference to the labors of one man who has lately passed away from earth to his great reward, and who was a common benefactor both of the medical profession and of those who till the soil. He was much more, he was a benefactor to the whole human race. I mean Louis Pasteur. Born in the little town of Dole, in France, of humble parentage, his father was a veteran French soldier, afterward a tanner. The son Louis early in life became an enthusiastic student of nature and of natural laws. More than a half century ago he had begun the course of experimental research which destined him to become one of the greatest allies of the medical profession and of agriculture that the world has ever known.

One of his first triumphs was the discovery of the cause of the silk-worm disease In 1849 and 1850 the silk-worms were attacked with a parasitic disease which caused the loss to France, in the silk-worm industry alone, of $20,000,000 in a single year. The plague spread to Spain and Italy, and finally no eastern country was exempt from its ravages except Japan. Pasteur was urged to study the subject with the view of finding the cause of the disease and its prevention. He gave his whole attention to this question for nearly three years, and so zealously did he pursue his experiments that his health broke down, he became enfeebled, and was stricken with partial paralysis in 1868, while he was in the midst of this important work. He had, however, already found the cause and the mode of prevention, which consisted in separating the healthy moths from those which were sick, carrying out the true principle of isolation in infectious diseases, and thus he restored the silk industry to France. He never fully recovered from the partial paralysis which he suffered, so far as his body was concerned, but for nearly thirty years his mind remained undimmed, and during these thirty years he discovered the mode of curing those who are bitten by mad dogs, until his Institute at Paris became the centre to which afflicted people resort from all parts of Europe for treatment. Another important discovery which he made was the cause of fowl or chicken

cholera, to which he also gave earnest attention and found that this, too, was a parasitic disease. The disease known as splenic fever or malignant pustule next attracted his attention. A young veterinary surgeon (Dr. Louvrier) had proposed a definite method for treating the disease, which has always been very fatal to sheep and cows in France and Russia Pasteur immediately entered upon the investigation of this disease, and in less than two years he had solved the question, and a day was appointed for a public trial or test of its efficiency. I will let his biographer tell the story in his own words: —

"Pasteur accepted. The experiments were conducted at Melun, May 5, 1881, a few miles above Paris, on the Seine. The Society of Agriculture agreed to place at his disposal sixty sheep. The results of these experiments were absolutely successful and convincing to the most sceptical.

"There was a burst of enthusiasm at these truly marvellous results. The veterinary surgeons especially could not recover from the surprise. They examined the dead, they felt the living.

"'Well,' said M. Bouley to one of them, 'are you convinced? There remains nothing for you to do but to bow before the master,' he added, pointing to Pasteur, 'and to exclaim "I see, I know, I am undeceived."'

"Having suddenly become fervent apostles of the new doctrine, the veterinary surgeons went about proclaiming everywhere what they had seen. One of those who had been most sceptical carried his proselytising zeal to such a point that he wished to inoculate himself.

"An extraordinary movement was everywhere produced in favor of this method of preventive treatment. A great number of agricultural societies wished to repeat the celebrated experiment. The breeders of cattle overwhelmed Pasteur with applications for vaccine. At the end of the year 1881 he had already treated 33,946 animals. In 1882 the number amounted to 399,102."

But Pasteur still lives in his works. He lives also in his pupils. To one of these we owe the recent discovery of the most potent means which have yet been found for diminishing the fatality of that terrible scourge and destroyer of children, *diphtheria*. From the teaching of this man there comes help to the agriculturist and to the physician; yes, to all mankind.

Let me not close without commending to every farmer as an addition to his library the biography of such a man as Pasteur, together with the works of Thoreau, of John Burroughs, of Bolles and Bradford Torrey, and of good old Gilbert White of Selborne. It is from the study of the writings of such men that our eyes are opened to see the life that surrounds us in the woods, the fields, the ponds and the streams, and to learn from every living thing some new and useful lesson.

Series of 1900. Bulletin No. 6.

MASSACHUSETTS

CROP REPORT

FOR THE

Month of October, 1900.

ISSUED BY

J. W. STOCKWELL,

Secretary State Board of Agriculture.

BOSTON:
WRIGHT & POTTER PRINTING CO., STATE PRINTERS,
18 Post Office Square.
1900.

Crop Report for the Month of October, 1900.

Office of State Board of Agriculture,
Boston, Mass., Nov. 1, 1900.

Bulletin No. 6, Crop Report for the month of October, the final issue of the season, is herewith presented. We wish once more to thank our correspondents for the assistance they have so freely and consistently given us. We shall look to each and every one for the renewal of their good offices another spring if this work is continued, as it doubtless will be.

The special articles printed this season have been: Bulletin No. 1, "Some Insects injuring Market-garden Crops," by Prof. H. T. Fernald; Bulletin No. 2, "Possibilities for Farm Forestry in Massachusetts," by Allen Chamberlain; Bulletin No. 3, "Birds as Protectors of Woodlands," by E. H. Forbush; Bulletin No. 4, "Poultry Keeping on the Farm," by Prof. A. A. Brigham; and Bulletin No. 5, "The Relation of Agriculture to the Public Health," by Dr. Samuel W. Abbott. Particular attention is called to the article on "Soil Exhaustion," by Prof. Geo. E. Stone, professor of botany at the Massachusetts Agricultural College, which will be found printed at the close of this bulletin.

Progress of the Season.

The October report of the statistician of the United States Department of Agriculture gives the average condition of corn on October 1 as 78.2, compared with 80.6 last month, 82.7 last year and 81, the mean of the October averages of the last ten years.

The preliminary estimate of the yield per acre of oats was 29.6, as compared with 30.7 bushels last year, 27.8 bushels in 1898 and a ten-year average of 26.2 bushels.

The preliminary estimate of the yield per acre of barley was 20.4 bushels, as compared with a yield of 25.5 bushels last year, 21.6 bushels in 1898 and a ten-year average of 23.3 bushels.

The preliminary estimate of the yield per acre of rye is 15.1 bushels, as compared with 14.4 bushels last year, 15.6 bushels in 1898 and a ten-year average of 14 bushels.

The average condition of buckwheat on October 1 was 72.8, as compared with 80.5 last month, 70.2 last year and 82.2, the mean of the October averages for the last ten years.

The average condition of potatoes was 74.4, as compared with 80 last month, 81.7 last year and a ten-year average of 74.1

There had been a general decline in the condition of sweet potatoes.

The sugar cane crop of Louisiana maintained its high condition of the previous month, 101, but in every other State there was an impairment of condition.

The condition of sorghum improved in Kansas, Texas and Arkansas and declined in North Carolina, Georgia, Mississippi, Kentucky and Tennessee.

There was a general decline in the condition of apples, but in many of the principal apple-growing States the condition was still considerably above the average.

Rice declined in condition in the South Atlantic States from lack of rain.

The average condition of cotton was 67, as compared with 68.2 last month 62.4 last year and 71.6, the mean of the October averages of the last ten years.

In Massachusetts the average yield of oats per acre was given as 37, and the average quality as 90; the average yield per acre of barley as 26, and the average quality as 87; the average yield per acre of rye as 17, and the average quality as 90; the average condition of corn October 1 as 92; the average condition of buckwheat as 87; the average condition of tobacco as 102; the average condition of potatoes as 69; and the average condition of apples as 85.

Massachusetts Weather, 1900.

[Compiled from Data furnished by the New England Weather Service.]

January was milder than usual. The month opened with the first general snow-storm of the season, and the precipitation for the month, rain and snow combined, was in excess of the normal by a half inch. A moderately intense cold wave prevailed for the first four days, but the temperature for the month was in excess. There was an average amount of sunshine.

February was distinguished by much unpleasant weather and a precipitation of more than 4 inches above the normal. Excepting rain on the southern coast this was chiefly in the form of snow. The monthly mean temperature was above the normal for February, but the coldest weather of the season occurred during the month.

March was notable for a preponderance of fine, clear weather, there being much more than is usually experienced during this month. Nevertheless the precipitation was fully up to the normal, and for the greater part of the State from 1 to 2 inches in excess. The month was colder than usual, the monthly mean temperature being 1.5° below the normal.

April was a pleasant month, with more than the average amount of fair weather. The precipitation was deficient, the average amount for the month being about one inch below the normal. The temperature was fairly well distributed throughout the month, and the monthly mean was about 1° above the normal for April. The temperature fell below freezing during the month at all stations.

May, as a whole, was a very unpleasant month, and the rainfall was also considerably in excess of the normal amount for the month. This was fairly well distributed during the period. The average temperature for the month was considerably below the normal, the daily deficiency amounting to about 1° per day. Killing frosts were of general occurrence on the 10th and 11th. The prevailing winds were from the east and north. At the close of the month the tendency was to rising temperature and warmer weather.

June opened with warm weather, the average temperature for the first two or three days ranging above the normal.

Showers, timely and well distributed, afforded sufficient moisture. The second week of the month was continuously warm, but the temperature was not excessive and the rainfall was light. There was a continuance of these conditions through the third week. The temperature of the closing week did not vary greatly from the normal, but the precipitation was deficient and irregularly distributed. There were fewer thunder-storms than usual during the month and they were of moderate type.

The month of July was characterized by varied and extreme conditions of weather. Until the 6th the temperature averaged from 2° to 5° below the normal. There was much cloudiness at this time but the rainfall was light. The second and third weeks were excessively warm. From the 16th to 18th inclusive the maximum temperatures ranged in the 90s, and the minima very little below 80°. There was also a general deficiency of rain. On the 20th to 22d cool weather prevailed. This was followed by a few days of moderate summer heat, resulting in a general rain-storm on the 25th and 26th. The month closed with several days of fair weather.

The first five days of August gave clear weather with cool nights, the cool wave breaking the record for the month for many years past. This was followed by a period of warm weather with a high per cent of moisture. There were frequent showers from the 6th to the 10th, with the rainfall light to moderate. The third week of the month was characterized by much cloudiness and rain. Comparatively low temperatures accompanied the foul weather. The remainder of the month was generally fair, with great extremes in temperature. The rainfall of the month was generally sufficient to maintain growing conditions, but the earth, below the surface, was dry to a considerable depth.

The weather of September was characterized by a high average temperature, more than the normal number of clear days and rainfall above the normal for the month. The temperature was, however, equitably distributed, and there were no excessively warm days, the minimum temperatures ranging unusually and continuously high. The coolest period was from the 18th to the 20th, and the closing days of the

month were cool. The rainfall was chiefly the result of two general storms, during which the precipitation was very heavy. The gale of the 12th was general and did much damage to fruit. The wind attained a velocity at Boston of 60 miles an hour.

The Weather of October, 1900.

The weather of the month was remarkably pleasant. There were about the average number of days with rain, the amount of which was fairly well distributed throughout the several sections of the State. Excepting the heavy fall of the night of the 8th the storms were moderate, and the rate of fall such as to be of the greatest benefit to vegetation. There was a week of overcast skies, from the 6th to the 12th of the month, but for the remainder of the period the days of sunshine and cloudiness were about equally divided. The weather was abnormally warm, viewing from a point of mean temperature, the daily means at Boston being in excess of the normal for two-thirds of the days. There were also some extremes in the maxima temperatures. The mercury has ranged higher in this month in the twenty-eight years covered by the national meteorological observations but only in the early days of the month. The current month was remarkable for a continuous moderate temperature and for the period in the later part of the month with a maxima of near 80° for several days. At Boston the maximum rose to 77° on the 22d and to 80° on the 23d and the 24th. This record is not paralleled in October at this station during the past twenty-eight years of official records. Killing frosts and occasional freezing temperatures were of occurrence from the 16th to the 22d, but excepting these days there was a general absence of frost. Fogs were prevalent in coast sections during the closing week of the month. There were no unusual features shown in the records of wind direction and velocity or those of air pressure. October, 1900, as a whole, will be remembered and will go on record as a month of most pleasant weather.

Crops of the Year.

The spring opened late and the cold weather of May tended to still further retard vegetation. The frosts of the

10th and 11th did much damage to early vegetables and in a lesser degree to the fruit crop. Pastures and mowings were generally in excellent condition. Fall seeding did not winter as well as usual, owing to the lack of snow-covering during the winter. The fruit bloom was the heaviest in years. The severe frosts of the 10th and 11th injured peaches and strawberries severely, plums and cherries to a lesser degree, and apples practically not at all. Insects did very little damage. Spraying is increasing, but not rapidly. There was a fair supply of good farm help. Wages average about $18 per month with board and about $1.25 per day without board. There was even less change than usual in the acreage of farm crops.

In June there was very little injury from insects. Cool weather held corn back, but it was otherwise in good condition. Haying was not generally begun and the crop did not promise to be up to the average. Early potatoes showed a slight increase in acreage in eastern sections, and there was prospect of a good crop. Early market-garden crops, with the exception of asparagus, were about average as to yield and price. The supply of dairy products was about normal, with prices slightly increased. Pasturage was in good condition, though likely soon to need rain. Strawberries were far from a good crop, but the prices ruled high. Apples promised a good crop; peaches a light crop; pears fair and plums generally a light crop; cherries were a very poor crop, having suffered badly from frost.

No noticeable damage from insects was reported in July. Indian corn was generally in good condition, though perhaps a little late. Silos continue to gain in popularity. Haying was completed with from two-thirds to three-fourths of a full crop; quality good and condition first-class. The acreage of forage crops was considerably increased because of the short hay crop, and they were generally in fair condition. Market-garden crops were generally short, owing to drought; prices about as usual. Early potatoes were nearly a failure, owing to drought. Apples promised a good crop; pears fair; plums light; peaches light; quinces and grapes good. Pastures were in need of rain in all sections. Rye, oats and barley were generally good average crops.

At the end of August Indian corn promised a fine crop in all except Essex, Middlesex and Barnstable counties, where it was somewhat off. Rowen was a light crop in all sections. Late potatoes were below the average, owing to drought. Blight was not general and there was little rot. Tobacco was generally an excellent crop and cutting was practically completed at the end of the month. Apples promised a good crop; pears fair; peaches light; grapes good; cranberries light. Pastures were far from being in good condition and cattle were fed at the barns in many sections. Oats and barley were below the average as to grain and straw. Poultry keeping was generally found profitable, but not enough attention is paid to it in most cases.

Indian corn in September was rather more than an average crop in western and central sections and rather less in eastern. The rowen crop was far below the normal, and in many sections was practically a failure. Fall feed was also far below the normal. Much less than the usual amount of fall seeding had been done, owing to the drought, and much of it was just coming up. Onions were less than an average crop. Potatoes were probably not over a two-thirds crop; little rot and quality good. The prospects for root crops were not flattering. Celery was a fairly good crop. Apples promised to give one of the largest crops on record, but the gale of 12th took off from one-third to one-half of them. Little was done to utilize the windfalls, except for cider for vinegar making. Pears were a fair crop; plums light; peaches average; grapes a very good crop; cranberries little, if any, over half a crop.

In the circular to correspondents returnable to this office October 23, the following questions were asked: —

1. Have root crops proved to be average crops?
2. What is the condition of farm stock?
3. What is the condition of fall seeding?
4. How have prices for crops raised for market compared with former years?
5. Which of the leading crops in your locality do you think have been most profitable?
6. Which of the leading crops in your locality do you think have been least profitable?

7. Considered as a whole, has the season been a profitable one for your farmers?

Returns were received from 150 correspondents, from which the following summary has been made.

Root Crops.

The fall rains, while of great benefit to root crops, did not suffice to bring them quite up to the usual average of condition for the State as a whole. Generally speaking they approximate more nearly to the normal in western and central sections. In eastern and south-eastern sections the reports indicate that these crops will fall considerably below the usual yields. Potatoes would appear to be one of the poorest crops for a series of years. Prices, however, rule above the average.

Farm Stock.

The rains have put pastures and mowings in good shape, and fall feed is now extremely good. The effect of this is shown in the improvement in the condition of farm stock, much more of it being in good condition than was the case a month ago. There are some complaints of stock being thin in flesh, but these are not numerous. Cows in milk were fed at the barn in many sections during the drought, or we would not have such a satisfactory condition to report.

Fall Seeding.

Much less than the usual amount of fall seeding was done, owing to the drought, and that put in was retarded in germination by the same cause. Since the rains most of it has come up, and with the warm weather to aid, has pushed along finely, so that it is now quite generally in good condition, though still late and small in some cases.

Prices.

With the exception of apples, prices for which are low on account of the large crop on hand, prices for farm crops have ranged rather hi her than usual. This is probably mainly due to the shortage caused in most crops by the drought. Of 149 answers to this question 89 correspondents speak of prices as average, 54 as higher than usual and 6 as lower.

Most Profitable Crops.

There is the usual difference of opinion among correspondents as to which crops have proved most profitable, and as usual a majority fail to unite on any one crop. Fifty-four correspondents consider corn to have been among the most profitable crops; 46, hay or grass; 31, potatoes; 9, sweet corn; 7, apples; 7, tobacco; 5, asparagus; 5, tomatoes; 4, cabbages; 4, onions; 4, celery; 4, cranberries; 3, milk; 3, fruit; 2, oats; 2, forage crops; 2, peaches; 1, market-garden crops; 1, buckwheat; 1, barley; 1, millet; 1, squashes; 1, beans; 1, pears; 1, beets, and 1, peas.

Least Profitable Crops.

Seventy correspondents, an unusually large number to agree on any one crop, speak of potatoes as among the least profitable crops; 28, apples; 17, hay or grass; 8, corn; 7, onions; 4, cabbages; 3, oats; 3, fruit; 3, root crops; 3, peas; 2, milk; 2, tomatoes; 2, strawberries; 2, squashes; 2, turnips; 1, pears; 1, celery; 1, melons; 1, sweet corn; 1, cucumbers; 1, carrots; 1, market-garden crops, and 1, beans.

Profits of the Season.

The season has not been one that could be called generally profitable for our farmers. The prolonged drought of summer and early fall cut many crops short to such an extent that the increased prices received failed to make up for the shortage. Starting the summer with empty barns, the short hay crop and scanty pasturage materially increased the cost of producing dairy products, and in many cases the farmers now face the winter with barns so poorly filled with hay and forage as to necessitate either the purchase of hay or the sale of stock. Of 144 correspondents answering the question as to the profits of the season 43 regard the season as profitable, 17 as an average one for profit and 26 as fairly profitable, while 58 think that it has not been a profitable one.

NOTES OF CORRESPONDENTS.

(Returned to us October 22.)

BERKSHIRE COUNTY.

Sheffield (Dwight Andrews). — Root crops are about average. Farm stock is looking well. Not as much fall seeding has been done as usual, owing to the dry weather. Prices for crops raised for market have been about average. Hay has been our most profitable crop and apples and potatoes our least profitable ones. Considered as a whole, the season has not been an average one for profit.

Becket (Wm. H. Snow). — Root crops are up to the usual average. Farm stock is in very good condition. Fall seeding looks well. Prices for crops raised for market have been fully up to former years. Corn and oats have been our most profitable crops and potatoes our least profitable one. The season has been a profitable one, considered as a whole.

West Stockbridge (Wm. C. Spaulding). — Root crops are up to the average on the whole. Farm stock is in fair condition. Fall seeding is in fair condition but needs rain. Prices for farm crops have ruled a trifle higher than last year. Considered as a whole, the season has been a profitable one. The apple crop is abundant, too many for profit or to handle, winter fruit bringing about 50 cents per barrel.

Washington (E. H. Eames). — Root crops are good average crops. Farm stock is in good condition. Fall seeding is in good condition. Potatoes command the largest price for years; other crops about as usual, except apples, which are low. Potatoes have been our most profitable crop and apples our least profitable one. The season has been, as a whole, about as last year for profit.

Richmond (T. B. Salmon). — Root crops have proved to be good average crops. Farm stock is in good condition. No fall seeding has been done. Prices for crops raised for market have ranged about average. Hay has been our most profitable crop and potatoes our least profitable one. Considered as a whole, the season has been a profitable one for our farmers.

Dalton (W. B. Barton). — Root crops are up to the usual average. Farm stock is in fair condition. Fall seeding is in good condition. Prices for farm crops have been fully as good as usual. Milk has been our most profitable product. I should consider the season a profitable one. Late rains have put meadows in fair condition. Pastures as a rule have been fed very close, but appear to be in fair condition. Many farmers are feeding large quantities of cider apples, native fruit being very abundant.

Windsor (W. H. Tirrell). — Root crops are up to the usual average. Farm stock is in good condition. Fall seeding is in poor condition. Prices for farm crops have been about as in former years. Corn has been our most profitable crop and potatoes our least profitable one. Considered, as a whole, the season has not been a profitable one for our farmers.

Savoy (W. W. Burnett). — Root crops are full average crops. Farm stock is in fair condition. Fall seeding is in good condition. Most crops are fully up to the average in price. Hay has been our most profitable crop and potatoes, on the whole, our least profitable one. The season has been a fairly profitable one. Apples are so abundant that the crop is not paying very well.

New Ashford (Elihu Ingraham). — Root crops are up to the average. Farm stock is in fair condition. Fall seeding is in good condition. Prices for farm crops have compared well with other years. Corn has been our most profitable crop and oats and potatoes our least profitable ones. The season has not been a profitable one, considered as a whole. The dry weather caused the grass crop to be light and ruined the pastures.

FRANKLIN COUNTY.

Monroe (D. H. Sherman). — Root crops are less than the average, owing to drought, perhaps two-thirds to three-fourths crops. Farm stock is in very fair condition. But very little fall seeding has been done in this section. Apples have brought from one-half to two-thirds the usual prices; potatoes bring fair prices; turnips average. Potatoes have been our most profitable crop and hay our least profitable one. The season has been about an average one for profit, taken as a whole.

Heath (O. D. Canedy). — Root crops are up to the usual average. Farm stock is rather thin in flesh as a rule. Fall seeding has been almost a failure, owing to drought. Prices of crops raised for market have compared fairly well with former years. Apples will be our most profitable crop if they bring a fair price, as there is a large crop of fine fruit. Potatoes have been our least

profitable crop. I do not think the season has been a profitable one, taken as a whole.

Charlemont (S. W. Hawkes). — Root crops are up to the usual average. Farm stock is generally in good condition. Fall seeding was never in better shape. Prices for farm crops have ranged somewhat lower than usual. Corn has been our most profitable crop and apples our least profitable one. Considered as a whole, the season has been a profitable one.

Leyden (U. T. Darling). — Root crops have proved to be average crops. Farm stock is looking well. Fall seeding is in good condition. Prices for crops raised for market have been better than usual. Hay has been our most profitable crop and potatoes our least profitable one. I think the season has been a profitable one for our farmers.

Ashfield (Chas. Howes). — Root crops are fair average crops. Farm stock is coming to the barn in good condition. Fall seeding is very backward and many pieces will have to be reseeded. With the exception of apples, prices for farm crops are higher than usual. Although rather light, the hay crop is our most profitable crop. The potato crop was very light in some sections and is perhaps our least profitable crop. I think the season has been above the average for profit, notwithstanding the drought. The frequent fall rains have kept the ground in good condition and mowings and pastures are looking remarkably well for the time of year.

Conway (J. C. Newhall). — Root crops are hardly average, owing to the drought. Farm stock is looking much better than could be expected, considering the short feed in pastures. Fall seeding has made rapid growth since the rains and is looking very well now. At present prices tobacco is our most profitable crop. Potatoes were a very light crop and therefore unprofitable and at present prices there is no profit in apples. Taking everything into consideration I think it has been a fairly profitable season with our farmers.

Sunderland (J. M. J. Legate). — Root crops are not more than half crops. Cows are coming in from pasture in fine shape and farm stock generally looks well. Fall seeding is in normal condition. Prices for farm crops are somewhat better than for the past few years. Tobacco has been our most profitable crop and onions our least profitable one. The season has been a profitable one for mixed farming, but those depending entirely upon onions cannot have found it so, as the crop is light and prices are little higher than last year.

Montague (C. S. Raymond). — Root crops of all kinds are about average. Farm stock is in good average condition. Fall seeding is backward but is in fairly good condition. Potatoes are a little higher in price than last year; other crops about the same. Potatoes have been our most profitable crop and onions our least profitable one. The season has been a profitable one, considered as a whole. Grass roots are in fair condition on good soil, but are rather feeble on light, thin soil.

New Salem (Daniel Ballard). — Root crops have been a little short on dry ground, but on rich, moist soil are above the average. Farm stock is in fair average condition. Fall seeding is looking fairly well, though but little was done. Prices for farm crops have been well sustained. Corn has been our most profitable crop, having suffered less from drought than any other, and hay our least profitable one. The season has been fairly profitable as farming goes, the profits seldom being large.

HAMPSHIRE COUNTY.

Prescott (W. F. Wendermuth). — Root crops are good average crops. Farm stock is in fair condition. Very little fall seeding has been done. Potatoes bring higher prices than usual, apples lower; on the whole, average prices prevail. Corn and apples are our most profitable crops and hay and potatoes our least profitable ones. The season has hardly been an average one for profit, since cream and veal are the principal money products, and the short hay crop and dry pastures have reduced the total amount produced.

Enfield (D. O. Chickering). — Root crops suffered from the drought and are not quite up to the average. Farm stock is looking well for the most part. Fall seeding is in good condition. Prices for crops raised for market have been fully up to the average. The corn crop has been unusually good and is perhaps as profitable as any. Hay has been our least profitable crop. Considered as a whole, the season has been a profitable one.

Belchertown (H. C. West). — Root crops are fully up to the average. Farm stock is in very good condition. Fall seeding is in fair condition, although somewhat late. Hay, potatoes and dairy products bring higher prices than usual; other crops about the same. Hay, potatoes and dairy products have been our most profitable lines and apples our least profitable crop, although good in both quantity and quality. The farmers have little reason to complain, crops being bountiful and the fall season the best for harvesting in many years.

Amherst (H. A. Parsons). — Root crops are up to the usual average. Farm stock is in fair to good condition. Fall seeding is in good condition. Prices have compared well with other years. Corn has been our most profitable crop and potatoes our least profitable one. Considered as a whole, the season has been a profitable one for our farmers. This has been an uncommonly open fall, with no killing frost until the 18th.

Hadley (H. C. Russell). — Root crops are up to the usual average. Farm stock is in fair condition. Fall seeding is in very good condition. Vegetables bring somewhat higher prices than usual; other crops about the same. Tobacco has been our most profitable crop and onions our least profitable one. The season has been a profitable one for our farmers, taken as a whole.

South Hadley (H. W. Gaylord). — Turnips were so late in coming up that they are not yet half grown. Farm stock looks well enough, but young stock has not made the growth expected. Fall seeding looks fairly well now, but is small, owing to late seeding and reseeding. Prices have not advanced much except for potatoes, which have gone up 25 cents per bushel. None of our leading crops were profitable, but corn comes the nearest to an average crop. Fruit has been our least profitable crop. The season has not been a profitable one with our farmers. Their most serious loss is in the hay crop, and stock must be reduced in view of the present and probable winter prices of hay and grain.

Goshen (Alvan Barrus). — Root crops are up to the usual average. Farm stock is in fairly good condition, as a whole. Fall seeding is in unusually good condition. Fair average prices have prevailed, except for apples. Hay has been our most profitable crop if sold, but is not where kept to feed. The apple crop has been our least profitable one when picking, barreling and freighting are paid for. The season has not been a profitable one for general farmers.

Cummington (S. W. Clark). — Root crops are up to the usual average. Farm stock is in fair condition. Very little fall seeding has been done, owing to the drought. Fruit brings very low prices; other crops average. Corn has been our most profitable crop and potatoes our least profitable one. Our income is mainly from dairying. Butter has sold for nearly 2 cents per pound higher than last year, so dairymen have surely had a fairly good year. Those who raise calves and sell cows, and who sold early, have had a very good year.

Middlefield (J. T. Bryan). — Root crops are up to the usual average. Farm stock is in excellent condition. No fall seeding has been done because of the drought. Prices for farm crops are

higher than usual, except for apples. Corn and potatoes have been our most profitable crops and fruit our least profitable one. Considered as a whole, the season has been a profitable one.

HAMPDEN COUNTY.

Chester (P. M. Adzima). — Root crops are up to the full average. Farm stock is in a little better condition than farmers expected. Fall seeding is in good condition. Prices for crops raised for market are fully up to the average. Hay has been our most profitable crop and apples our least profitable one. The drought has been very severe, but the season has been about an average one for profit.

Granville (Joseph Welch). — Root crops are below the average. Stock looks thin, owing to poor feed, flies and dry weather. What fall seeding there was done is coming on very well, owing to the late rains. Prices for farm crops have ranged higher than usual. Apples, hay and corn have been our most profitable crops and potatoes our least profitable ones. The season has not been a profitable one, as farmers will be obliged to reduce their stock because of the short hay crop; there is little market for apples, and potatoes were not over half a crop.

Westfield (C. F. Fowler). — Root crops are below the average on account of early drought. Farm stock is in fairly good condition. Fall seeding was late, but is now looking well. Prices for farm produce have been well maintained, at a little higher rates than usual. Market-gardening, hay and tobacco have given fairly good returns. Taken as a whole, the season has been a full average one for profit.

West Springfield (T. A. Rogers). — Root crops are about average. Farm stock is generally in good condition, all milch cows having been fed at the barns. Fall seeding looks well, but has been sown but a short time on account of the drought. Prices for farm crops have ranged above the average of the past few years. Hay, rye and tobacco have been our most profitable crops and potatoes, onions, apples and pears our least profitable ones. Feed is too high for us to make milk at a profit. The season has hardly been a profitable one. Pastures and mowings now look better than at any time since June.

Ludlow (C. B. Bennett). — Root crops are up to the usual average. Farm stock is in good condition. Fall seeding is in fair condition. Hay and straw command higher prices than usual; other crops average. Corn has been our most profitable crop and potatoes our least profitable one. The season has hardly been a

profitable one, as most of our farmers depend on milk and potatoes for their money, and the short hay and potato crops have cut down the profits in those directions. The abundance of fall feed has helped out the hay crop somewhat and farmers are hoping to be able to winter their stock.

Hampden (J. N. Isham). — Root crops are considerably below the average. Farm stock is in fairly good condition. Fall seeding has gained rapidly, owing to the warm weather. Prices for crops are generally better than last year. Corn, potatoes and apples have been our most profitable crops and hay and roots our least profitable ones. The season has been a trying one and there is but a narrow margin for profit after paying expenses.

Monson (A. H. White). — Root crops are not quite up to the average. Farm stock is rather thin. Fall seeding is backward. Prices for crops raised for market have been rather less than usual. It is difficult to select our most profitable crops, but apples have undoubtedly been our least profitable one. I do not think the season has been a profitable one for our farmers.

Wales (C. F. Crawford). — Root crops have yielded well. Farm stock is in good condition as a rule. Fall seeding looks well. Apples bring $1 per barrel; potatoes 70 cents per bushel; dairy products are high. Corn has been our most profitable crop and hay our least profitable one. Considered as a whole, I think we have had a fairly good season.

Holland (Francis Wight). — Root crops are very nearly up to the average. Farm stock is in fair condition. Not much seeding was done and what is done is backward. Prices for farm crops are about average with other years. Potatoes have been our most profitable crop and corn our least profitable one. All things considered, the season will be about an average one for profit.

WORCESTER COUNTY.

Warren (W. E. Patrick). — Root crops are up to the usual average. Farm stock is in good condition. Very little fall seeding has been done, but what there is is in good condition. Prices range about the same as for the past two years. Grass and corn have been our most profitable crops and potatoes our least profitable one. Considered as a whole, I think the season has been a profitable one for our farmers.

New Braintree (C. D. Sage). — The dry weather has reduced root crops one-third. Farm stock is healthy but is not in as good flesh as is usual at this season. Fall seeding is looking fairly well. Prices for farm crops are rather better than usual, but the yields

are small. Fodder corn has been our most profitable crop. Apples are our hardest crop to dispose of, but hay made the poorest yield. The season has not been a profitable one, when compared with former years, as it has been a hard season to make milk, owing to the short pastures and the poor hay crop.

Dana (E. A. Albee). — Root crops are up to the usual average. Farm stock is in good average condition. Fall seeding is looking well but is late because of the early drought. Prices for farm crops average well, except for apples, which were never so low. Corn and hay have been our most profitable crops and potatoes and apples our least profitable ones. The season has not been an average one for profit on account of the long-continued drought.

Petersham (S. B. Cook). — Root crops are average crops. Stock is in high condition. Fall seeding was late in getting started but has done well since the rains. Prices for farm crops have compared favorably with former years. Hay and corn have been our most profitable crops and potatoes and apples our least profitable ones. Considering all crops, the season will compare favorably with previous ones for profit.

Royalston (C. A. Stimson). — Root crops are up to the usual average. Farm stock is in fair condition. Fall seeding is coming on well. Prices for crops raised for market have ranged higher than usual. Potatoes have been our most profitable crop and peas our least profitable one. Considered as a whole, the season has been a profitable one for our farmers.

Ashburnham (Albert Needham). — Root crops are up to the usual average. Farm stock is looking well. The recent rains have had a good effect on fall seeding and it is looking well. Prices for farm crops have been lower than usual, but the demand has been brisk. It is hard to tell which of the leading crops have been most profitable and which least profitable. Considered as a whole, the season has been a profitable one for our farmers.

Templeton (Lucien Gove). — The drought holding on so late has prevented root crops from making a full growth. Pastures have been poor all the season and stock is rather thin in flesh. Fall seeding was late and the growth is rather backward. There has been no material change in the prices of farm crops. Corn, cabbages, forage crops and hay have been our most profitable crops and potatoes, apples and roots our least profitable ones. The season has been the most unprofitable one with us for a number of years.

Hubbardston (C. C. Colby). — Root crops have made a good growth. Stock is looking well. Very little fall seeding has been done. All crops except apples bring good prices. Corn has been

our most profitable crop. The dry weather cut off some crops and made a short hay crop, but the farmers put in an uncommonly large amount of forage crops, so that nearly all will be able to winter the usual amount of stock, although most farmers are selling all surplus young stock and weeding out the poorer cows.

Princeton (A. O. Tyler). — Root crops are up to the usual average. Farm stock is in average condition. Fall seeding is in good condition. Potatoes bring average prices; apples low; root crops about as usual. Corn and grass have been our most profitable crops and potatoes our least profitable one. The season has not been a profitable one; although milk has sold for a little more than usual it has cost more to make it than the increased price would cover.

Harvard (J. S. Preston). — Root crops are fairly good. Farm stock is looking fairly well. Fall seeding is looking well but needs rain. Prices for farm crops have been rather higher than usual. Apples and hay have been our most profitable crops and potatoes our least profitable ones. On the whole, the season has been a profitable one. Pastures and mowings have not looked as well since early summer as they do now.

Northborough (J. K. Mills). — Root crops are not up to the usual average, owing to dry weather. Farm stock is in good condition where the pastures were not overstocked. Fall seeding is in good condition, though little has been done. Prices for farm crops have been about the same as usual. Asparagus, potatoes and milk have been our most profitable products and onions, cabbages and apples our least profitable ones. Our farmers will be able, at least most of them, to pay their bills and perhaps pay 2 per cent on the money invested.

Holden (G. S. Graham). — Late root crops have grown fast during the warm autumn weather and look well. Farm stock is thin in flesh and those coming from pastures have gained but little since turning out. Fall seeding has done finely of late and is nearly up to the average. Prices for farm crops have kept up very well, but are hardly up to the increased cost of production. Corn and ensilage corn have been our most profitable crops and hay has been very disappointing. The season has not been a very profitable one as the high cost of grain and labor have more than offset any little gain in prices.

Oxford (D. M. Howe). — Farm stock is in very good condition just at present. Fall seeding is in good condition. Prices for crops raised for market have been about average. Apples have been our most profitable crop and potatoes our least profitable one. The season has been a profitable one, taken as a whole.

Since the rains Hungarian grass and late barley have grown very rapidly.

Hopedale (Delano Patrick). — Root crops are not up to the usual average. Farm stock is in good average condition. Fall seeding is backward. Prices for crops raised for market have been about the same as in former years. The grass crop is, as usual, our most profitable crop. Considered as a whole, the season has been somewhat less profitable than usual.

Blackstone (O. F. Fuller). — Root crops are up to the usual average. All farm stock is looking well. Fall seeding is in fair condition. Prices for farm crops have ranged a little higher than usual. Tomatoes have been our most profitable crop, on the whole, and celery our least profitable one. Potatoes sell at from 60 to 70 cents per bushel; onions at 75 to 80 cents per bushel; apples at from $1.25 to $1.50 per barrel. Considered as a whole, the season has been a profitable one.

MIDDLESEX COUNTY.

Sherborn (N. B. Douglas). — Farm stock is in average condition. Fall seeding never looked better. Prices for farm crops have ranged higher than for the last few years. Peaches have been our most profitable crop and potatoes our least profitable one. The season has been fairly profitable and our farmers are not complaining of hard times as much as they did a few years ago. Milk raising is our leading industry, but the high price of grain more than offsets the advance in the price of milk.

Ashland (C. E. Adams). — Root crops are up to the usual average. Farm stock is in fair condition. Fall seeding is in poor condition. Prices for farm crops have ranged about average. Hay has been our most profitable crop and potatoes and milk our least profitable ones. Considered as a whole, the season has not been a profitable one. The grass roots in pastures and mowings are all right now, owing to the late rains. Apples have dropped badly so that there is not more than an average crop of No. 1 hand-picked fruit.

Framingham (H. S. Whittemore). — Root crops are above the average in yield and of good quality. Farm stock is in fine condition. Fall seeding now looks finely. Prices of crops raised for market have been better than in former years. Sweet corn has been our most profitable crop and potatoes, onions and melons our least profitable ones. I do not consider the season a profitable one, and think that where farmers come out even they do well.

Sudbury (E. W. Goodman). — Roots are about normal in con-

dition. Farm stock is looking well, considering the dry season. Early fall seeding did very poorly, but late seeding did well. The prices for farm products have been about normal. Celery and squashes have been our most profitable crops and corn and potatoes have been our least profitable ones. Considered as a whole, the season has been a fairly profitable one.

Littleton (G. W. Sanderson). — Root crops are up to the usual average. Farm stock is in good condition. Fall seeding is looking well. We have had quicker markets and better prices this year than usual. Grass and forage crops have been our most profitable crops and root crops our least profitable ones. Considered as a whole, the season has been fairly profitable.

Ashby (Anson Wetherbee). — Root crops are not up to the usual average. Farm stock is looking well. Fall seeding is looking well. Prices for farm crops have been a good average. Corn has been our most profitable crop and hay our least profitable one. The season has hardly been an average one for profit. Mowings and pastures are both looking green.

Townsend (G. A. Wilder). — Root crops are not up to the average. Farm stock is in good condition. Fall seeding is in fair condition. Prices for crops raised for market have been about the same as usual. Peaches, asparagus and potatoes have been our most profitable crops. The season has been a fair one for profit, though not up to the average. Indications pointed to a very large apple crop with low prices, but the high winds reduced the marketable quantity and prices are firmer.

Chelmsford (P. P. Perham). — Root crops are up to the usual average. Farm stock is in fair condition. Fall seeding promises well. Prices for crops raised for market have been a little better than the average. The hay crop has been our most profitable one and potatoes the least profitable. As a whole, the season has been fairly profitable for our farmers.

Carlisle (E. J. Carr). — Root crops are not up to the average. Farm stock is below the average in condition. Early fall seeding is in very poor condition, but the late seeding looks somewhat better. Prices for farm crops have been above the average. Corn and beans have been our most profitable crops and potatoes our least profitable one. The season has been a profitable one, as good prices have generally prevailed. Both pastures and mowings look well and promise well for another year.

Concord (Wm. H. Hunt). — Root crops are up to the usual average. Farm stock is looking well. Prices for crops raised for market have been rather better than for the last few years. Sweet corn, tomatoes, pears and early apples have been our most profit-

able crops. Potatoes sold well but the crop was light, and beans were a light crop. Considered as a whole, the season has been a profitable one.

Woburn (W. H. Bartlett). — Root crops are not good, though the rains have helped the late ones. Farm stock is looking well as cows were mostly fed from the barns where kept for milk, which kept them in good condition. Fall seeding was put in so late that its condition cannot be definitely given. Farm crops have brought fair average prices. None of our leading crops were profitable this year; perhaps early sweet corn did as well as any. The whole season has been very hard with us; the long drought injured early sown crops and at the same time hindered the germination of late ones. Grass is now looking very well and some rowen might be cut. Apples are about all picked; most of them were on the outside branches, the inner branches having but few.

Arlington (W. W. Rawson). — Root crops are not up to the usual average. Prices for crops raised for market have been very low. The season has not been a profitable one. The dry weather has injured many crops and the rains came too late to make a full crop. The market has been flooded with all kinds of truck from other sections, so that taking it as a whole, it has been a poor year for this locality.

Newton (Otis Pettee). — Root crops are a full average, taken as a whole, though late turnips are rather light. Farm stock is in very fair condition. Most fall seeding is looking well. Prices for farm crops compare favorably with previous years. Late potatoes, corn and celery have been our most profitable crops. Pasturage has been light and rowen scarce and poor. The fall rains have given new vigor to vegetation generally, but too late to save some of the crops.

ESSEX COUNTY.

Salisbury (Wesley Pettengill). — Root crops have not proved to be average crops, and some of them are not over half crops. Farm stock is in rather poor condition. Fall seeding is looking fairly well now. Prices for farm crops have been fully up to the average, except for apples. Hay has been our most profitable crop and potatoes our least profitable one. The season has been about an average one for profit; our apple crop will be quite a help, although the prices are low. The rains and warm weather of the past month have improved pastures and mowings wonderfully. The squash crop is light compared with other years.

Haverhill (Eben Webster). — Roots are rather light crops on dry land. Farm stock is in fairly good condition. Fall seeding

is in excellent condition. Prices for farm crops have been about up to the average. Potatoes have been our least profitable crop. The season has been a fairly profitable one as a whole. Drought hurt early potatoes, cucumbers, melons and other early crops somewhat on high land. Mowings and pastures have improved since the fall rains and are now in good condition.

Groveland (Abel Stickney). — Root crops are nearly up to the average. Farm stock is generally in good condition. Very little fall seeding was done this season. Prices for farm crops have compared favorably with other years. Corn and hay have been our most profitable crops. It is hard to decide which crops have been least profitable. The season has not been as profitable as some, owing to the light potato and hay crops. The late rains have made a great improvement in grass roots and we hope for good conditions in pastures and mowings another spring.

Newbury (G. W. Adams). — Root crops are up to the usual average. Farm stock is in fair to good condition. Fall seeding is backward, but is in fair condition. With the exception of apples and pears, prices for farm crops have been about average. Potatoes have been our most profitable crop and strawberries our least profitable one. The season has been nearly an average one for profit.

Andover (M. H. Gould). — Root crops are up to the usual average. Farm stock is rather thin in flesh. Fall seeding is in good condition. Prices for farm crops have been better than the average this year. Hay has been our most profitable crop and cucumbers for pickles our least profitable one. The season has not been a profitable one, as the late frost in the spring and the drought in the summer affected all crops. Also the low price of milk and the high price for grain, with the short pastures, make profits small on milk raising.

Wenham (N. P. Perkins). — Beets and carrots are average crops, but onions and parsnips are not. Cows are looking well on account of heavy feeding at the barns. Fall seeding is looking very well on well-manured land, otherwise on poor land. Prices for farm crops have ranged about as usual. Sweet corn, onions, beets and tomatoes have been our most profitable crops and carrots, potatoes, cabbages, squashes, apples and milk our least profitable ones. The season has not been a profitable one to date, but winter vegetables may sell better.

NORFOLK COUNTY.

Cohasset (E. E. Ellms). — Root crops have proved to be average crops. Farm stock is in good condition. Fall seeding is in

good condition. Prices for crops raised for market have been better than usual. Sweet corn has been our most profitable crop and potatoes our least profitable one. Considered as a whole, the season has been a profitable one for our farmers.

Randolph (R. A. Thayer). — Root crops are rather below the average. Our stock is mostly milch cows and they are in good average condition. Fall seeding is looking well. Market-garden crops have brought good average prices. Hay has been our most profitable crop and potatoes our least profitable one. The season has been a profitable one, taken as a whole. The rains of August and September brought a good after crop of grass on low, well-cultivated land, and now pastures and mowings seem to be in good condition for the season.

Canton (E. V. Kinsley). — Root crops are not up to the usual average. Farm stock is in good condition. Fall seeding was never in better shape. Prices have ruled high for farm crops. Sweet corn and peas have been our most profitable crop and potatoes our least profitable one. Milk has been short in supply about all summer, but the price has not been advanced. Winter milk may be a cent or two higher than last winter per can, but this is uncertain as yet. The season has been a fair average one for profit. Grass is in unusually fine condition for the coming winter.

Millis (E. F. Richardson). — Root crops are up to the usual average. Farm stock is in fair condition. Fall seeding is not up to the average in condition. Prices for crops raised for market have been fair this season. Hay and fruit have been our most profitable crops and potatoes our least profitable one. Considered as a whole, the season has been a profitable one for our farmers.

Franklin (C. M. Allen). — Root crops are from one-half to three-fourths crops. The dry season and poor pastures bring cattle to the barn thin in flesh. Early fall seeding made a poor catch, but late seeding is looking well. Prices for farm crops have been 10 per cent better than usual. Corn has been our most profitable crop and potatoes our least profitable one. Considered as a whole, the season has not been a profitable one, though some crops grown as a side issue, like strawberries, have been a success. The fall rains have strengthened grass roots and they are going into winter quarters in a strong, healthy condition.

BRISTOL COUNTY.

Easton (H. M. Thompson). — Root crops are not up to the usual average. Farm stock is in good condition, as many milch cows have been fed on the late rowen in the mowing fields. The

late rains and sunny weather have proved very beneficial to fall seeding. Prices for farm crops have been high, with perhaps the exception of apples, which have been a drug in the market. Hay has been our most profitable crop and garden truck the least profitable. Considered as a whole, the season has been fairly profitable.

Raynham (N. W. Shaw). — Root crops have been about up to the average. Farm stock is in fine condition. Fall seeding is backward. Prices for farm crops have been fully up to the average. Potatoes have been our most profitable crop and fruit our least profitable one. Considered as a whole, the season has been a profitable one for our farmers. I fear that the long drought of the summer will injure the hay crop of next year, as well as many crops of this season.

Seekonk (Fred A. Howe). — Root crops are not up to the usual average. Farm stock is looking very well. Fall seeding is in very good condition. Prices for farm crops have been about average. Asparagus, sweet corn and celery have been our most profitable crops and potatoes and tomatoes our least profitable ones. The season has been the worst for profit that our farmers have experienced in years.

Swansea (F. G. Arnold). — Root crops are up to the usual average. Farm stock is in good condition. On account of dry weather, seeding was very late, but is looking well now. Prices for farm crops have been about average. Potatoes have been the poorest with us, but prices have been fair. The season has not been a profitable one; hay crop short, grain high, potatoes almost a failure. Many meadows show much damage from white grubs.

Westport (A. S. Sherman). — Root crops are up to the usual average. Farm stock is in very good condition. On account of dry weather, fall seeding was late, but is now looking fairly well. Prices for farm crops are rather below the average. Hay has been our most profitable crop and potatoes our least profitable one. Considered as a whole, the past season has been unprofitable. It has been very dry; hay a short crop, but brings good prices; potatoes small crop and prices low; fruit plenty but not worth much. During the dry weather there was little feed for cattle, and farmers had to feed out the hay and fodder which should have been kept for winter.

PLYMOUTH COUNTY.

Hingham (Aaron Low). — Root crops are not up to the usual average. Farm stock is in fair condition. Since the rains fall seeding has done finely. Prices on most farm products are rather

low. Late cabbages have grown finely since the rains and have come nearer to an average crop than any other. Potatoes are not more than half a crop, small and scabby, and squashes are not one-quarter the usual yield. It has been a very hard season for the farmers, as most crops have been poor and prices have been low.

Marshfield (J. H. Bourne). — Root crops are about three-fourths crops. Farm stock is in very good condition. Fall seeding is in about average condition, the rains and warm weather having helped it very much. Prices are about 5 per cent higher than usual. Hay has been our most profitable crop and potatoes our least profitable one. The season has been a little below the average for profit, say 80 per cent.

Pembroke (Nathaniel Morton). — Root crops are up to the usual average. Farm stock is in about average condition. Fall seeding is in very good condition. Prices for crops raised for market have been about the same as usual. Grass has been our most profitable crop and turnips our least profitable one, although they have improved within a week. Considered as a whole, the season has not been a profitable one.

Bridgewater (R. Cass). — Root crops have made a fair growth but not a full one. Farm stock is in good condition. Owing to favorable weather, fall seeding is in good condition. Prices have ranged considerably higher than for the past two years. Cabbages have been our most profitable crop and peas our least profitable one, not having paid the expenses of raising. I do not think the season a profitable one. Grass in pastures and mowings is now in fine condition.

Carver (J. A. Vaughan). — Roots are smaller than usual. Farm stock is in good condition. Fall seeding is in good condition, owing to the late rains. Prices for farm crops have been about average this season. Cranberries have been our most profitable crop and strawberries our least profitable one. Most crops suffered from dry weather and returned but little profit.

Mattapoisett (E. C. Stetson). — Root crops are not up to the average. Farm stock is in about average condition. Fall seeding is late, but the present weather is favorable for it. Prices for farm crops have ranged a little higher than usual. Corn has been our most profitable crop and potatoes our least profitable one. Considered as a whole, the season has not been a profitable one.

BARNSTABLE COUNTY.

Bourne (D. D. Nye). — Root crops are up to the usual average. Farm stock is in very good condition, considering the summer

drought. Fall seeding is in very good condition. Prices for crops raised for market have compared favorably with former years. Hay and grass have been our most profitable crops and potatoes our least profitable one. The season has not been a profitable one, save in a few exceptional cases. Fall feed is now looking exceedingly well and the second crop of grass is growing finely.

Barnstable (JOHN BURSLEY). — Root crops are up to the usual average. Farm stock is in good condition. Fall seeding is in first-class condition. Prices for crops raised for market have been more than average. Cranberries have been our most profitable crop and hay our least profitable one. Considered as a whole, the season has been a profitable one for our farmers.

Harwich (A. N. DOANE). — Root crops are up to the usual average. Very little fall seeding has been done. Prices for farm crops range much higher than in former years. Corn and potatoes have been our most profitable crops. This has been a hard season for farmers on Cape Cod. Our cranberry crop was almost a failure.

Eastham (J. A. CLARK). — Root crops have not been up to the usual average. Farm stock is in fair condition. The season has been too dry for fall seeding. Prices for crops raised for market have been rather better than usual. Asparagus has been our most profitable crop and potatoes our least profitable one. Considered as a whole, the season has not been a profitable one.

Truro (D. E. PAINE). — Root crops are not up to the usual average. Farm stock is in fair condition. Fall seeding is in poor condition. Prices for farm crops compare favorably with former years. Potatoes have been our most profitable crop and turnips our least profitable one. Considered as a whole, the season has not been a profitable one.

DUKES COUNTY.

West Tisbury (GEO. HUNT LUCE). — Root crops have not been harvested but are looking well. Farm stock is in good condition. Fall seeding is in good condition. Prices for farm crops have been higher than in former years. Corn has been our most profitable crop and potatoes our least profitable one. It has been a very unprofitable season for our farmers.

BULLETIN OF

MASSACHUSETTS BOARD OF AGRICULTURE.

SOIL EXHAUSTION.

By GEO. E. STONE, Ph.D., *Professor of Botany, Massachusetts Agricultural College.*

The problem of soil exhaustion is one which the farmers of Massachusetts have been brought face to face with for many years. The land in this State having been deforested a number of times, and having been under cultivation or utilized for agricultural purposes for many generations, the primitive soil conditions, with their original storehouse of available plant food, have been to a large extent modified. The two factors that exert an influence on the soil are its chemical composition and its physical properties. These two factors are intimately connected, and, in general, one cannot be modified without changing the other. The chemical composition of the soil is fully as important for plant growth as its physical properties. The soil, however, may contain tons of plant food which are not available. On the other hand, the physical properties of the soil should be such that they are adapted to the plant in order that normal root respiration can take place. Unless the physical conditions are adapted to the plant requirements the amount and kind of available plant food exert very little influence in the growth of plants. Many plants, however, possess a wide range of adaptability and are not restricted to a definite soil texture. In some cases it is also essential that the particles of soil be of sufficient size, that their arrangements should be of a certain order, so that air spaces of a definite size are formed which are adapted to the particular plant under cultivation. It is, therefore, not only the size of the particles but their arrangement which determine the physical properties of the soil. The water-retaining capacity of the soil is also dependent upon its physical properties. A light sandy soil from Cape Cod possesses a water-containing capacity equal to 35 per cent, while the

heavier inland soils will possess 60 to 70 per cent water-retaining capacity. A soil, for example, that is adapted to onions is not adapted to lettuce and one which will grow potatoes will not necessarily grow tobacco. The influence of the physical properties of the soil can best be seen on our native species of plants. Every farmer has noticed the fondness of the white birch, pitch pine and scrub oak to dry, sandy or gravelly soils, and these plants are seldom seen on the heavier clay soils. There are, in fact, a considerable number of native plants in our State which are so particular about the physical condition of the soil that they can only be found in those localities where soil of a certain texture abounds. The peculiarities in the distribution of the wild plants would scarcely be noticeable except to a botanist, who has paid some attention to the physical conformity of our flora, and a knowledge of the habitats enables one to form a reliable conception of the nature of the soil upon which they are found growing. The rattle-box (*Crotalaria sagittalis*) and barberry are types of such plants, and, to a less extent, is the red cedar; the latter species seem to delight in the presence of numerous cobble stones as a soil condition.

It is our intention to consider the chemical and physical changes which have taken place in our Massachusetts soils during the past two hundred and fifty years, and to ascertain whether the common methods of cultivation which have been in vogue are well adapted to produce crops of the same magnitude as those produced formerly. During the last decade we have heard much of abandoned farms and worn-out soils, and it is well known that these farms were not always in a sterile condition, but that they contained at one time a considerable amount of plant food. We can again turn to the consideration of the adaptation of our wild plants, in order to obtain an idea of the changes which have taken place in our soils, inasmuch as their predominance and scarcity in certain localities gives us a clue to the soil conditions under which they are growing, and to what extent they fail to conform to their natural habitat. There are also many scattering historical records which show us that plants which were once common have fallen off immensely in certain localities during the last fifty or one hundred years.

It is not necessary for us to give a complete list of these plants which historical records and present distribution indicate have become less common; we will, therefore, take into consideration only a few of them. One of the most notable of these is the wild strawberry. This crop has deteriorated so in the greater part of Massachusetts that one cannot procure, without diligent search, a pint of

berries in a half a day's time. In olden time, however, this crop was exceedingly large, hence the practice of growing them in gardens was wholly unnecessary, and as a matter of history the strawberry was not cultivated to any great extent in this State previous to one hundred years ago. The former abundance of the strawberry in Massachusetts is mentioned by William Wood in 1635, and also by Roger Williams, in Rhode Island, in 1643, who stated that he had "many times seen as many as would fill a good ship within a few miles compass," and it was possible, as is well known to men now living, to gather a half bushel of strawberries in a few hours in certain localities in this State not later than seventy-five years ago, where a gill cannot be found at the present time. Many of our native grasses have deteriorated in a like manner. Among trees we find the beech, canoe birch and hemlock less common, the latter having fallen off to an enormous extent, and such plants as the orchids, ginsing, hobble bush and a host of others have become much less common in certain localities, as is evident to any one who has taken pains to study the past and present distribution of these species, and who has also taken into consideration their natural environmental adaptations.

The question naturally arises, what is the cause of this change in our floral conditions? This can be answered in a few words. It is due to a decrease in the organic matter of the soil and its associated humus compounds. There are other influences, however, which are in part responsible for the disappearance of certain species, notably the hemlock, where the light conditions for the growth of seedlings are at fault. It is, nevertheless, a lack of organic matter which is responsible for the decline of these species, taking them as a whole. In order that we may see the differences in the amount of organic matter that exists in a soil approaching the primitive condition and one that is more or less run out we can examine the following table. These analyses were made in each case with water-free samples.

Table showing the Amount of Organic Matter in Some Massachusetts Soils.

Sample.	Organic Matter at Surface (Per Cent).	Organic Matter below Surface (Per Cent).
1. Approaching primitive conditions, . .	31	20
2. Waste land (heavy soil), . . .	5	2
3. Lettuce soil (greenhouse), . . .	15	–*

* Practically the same as surface.

The percentage of organic matter shows, as might be expected, remarkable differences. Sample 1, which approaches primitive soil, was taken from a region where deforestation has not been common, and the large amount of organic matter represented here is the result of years of leaf decay. The color of the surface soil is black; at eight inches below the surface it is only a trifle lighter. Sample 2 presents a yellow color below the surface on account of the organic matter present being slight. This sample, which supported a growth of inferior grasses, goldenrods, etc., presented a dark color only at the surface. Sample 3 is a greenhouse soil adapted to forcing crops. These soils usually contain from 8 to 15 per cent of organic matter to a depth of 12 to 15 inches which is supplied by manure and by the decay of roots.

Those plants which have shown the greatest tendency to become rare, and in most instances are only to be found where there is more or less of an approachment to primitive soil conditions, are the humus-living plants, or those which depend upon organic matter. Not only is the number of humus-living plants decreasing, but their former luxuriance is by no means the same. Certain wild species of plants when grown in a soil similar to sample 1 are from one-half to three times as large as those grown in soils which contain a superficial layer of organic matter of a smaller percentage. There are limited areas in this State where the soil condition approaches a primitive state, and in such places plant development is much more luxuriant than in soils containing little organic matter, which is so typical of many of our present day soils. With the exhaustion of the organic matter in the soil there has taken place a change in its chemical and physical properties. It no longer possesses the same water-retaining capacity or the same amount of available plant food. In this way the floral conditions have been changed, and instead of finding the characteristic species of plants which once thrived in these soils we find their places taken by such species as the white birch, poplar, bush clovers (*Lespedezeas*), goldenrods, beard's-grass (*Andropogons*), Indian grass (*Chrysopogon nutans*), etc.

The cause of the decrease in organic matter may be traced to various operations. During the time of the early settlements of Massachusetts our ancestors found here woodland containing an exceptionally fine growth of trees, which constituted a forest difficult to penetrate. Here and there were open fields containing native grasses and herbaceous plants growing luxuriantly, and our large river valleys were especially noted as being free from dense forest growths. This native growth exhibited a natural adaptability subjected to the laws of natural selection, as its conformity

to physical conditions was not disturbed to any great extent through the agency of man. These natural conditions had probably existed since the glacial period, possibly ten thousand years more or less, and a considerable amount of organic matter, due to centuries of decay, covered the surface of the soil. Some of the clay hills had already been cleared by the Indians in early times for agricultural purposes, which were in turn eagerly sought for by the English migrators. The profuse growth of timber trees constituted a hinderance rather than a blessing to the early settlers, as a consequence of which large tracts of primitive growth were cut and burned on the spot. By this process a large amount of wood ashes was formed, which gave rise to remarkable crops of white clover, but at the same time the deposition of years of organic matter of a priceless value was destroyed by these fires. The cutting and burning process has been going on ever since, much to the detriment of the organic matter and crop production capacity of the soil. The open fields and meadows were once rich in organic matter, but these have become depleted through our methods of farming, which have consisted in taking everything from the soil without always making much attempt to replace that which has been removed. Had the practice of plowing in green crops been in vogue from the earliest times our soil would have shown much more of its primitive virginity, and its productiveness would have been much different at the present time.

The constant depletion of organic matter which is taking place in all of our soils is one of its most marked characteristics of the present time, and with this decrease has come inferior crops, an additional increase in certain weeds, and, as already pointed out, quite marked changes in the abundance and habitats of our native plants. It remains for us to consider how these exhausted soils can be brought back to a condition resembling their primitive form. It would take, to be sure, some centuries to restore these soils to their primitive form, as this would require the deposition and decomposition of an immense amount of vegetable matter. Inasmuch as nature has often assumed the role of a teacher in other matters, we can profitably turn to her guidance in considering how to make our depleted soils more like those formerly existing here, and which will in consequence be better adapted to support a crop.

The most rational method that we know of at the present time which appears to accomplish this to a certain extent is the continual plowing in of green crops. This practice is by no means resorted to as much as it should be by farmers. The cultivation of cover crops and subsequently turning them under not only increases the organic matter and food constituents of the soil,

thereby giving rise to larger crops, but the physical conditions are most favorably modified. Cover crops also conserve soil nitrogen and they prevent to a large extent the soil from washing during winter. A soil enriched by organic matter will retain more moist-

HORSE BEAN. RED CLOVER.

FIG. I. — NODULES ON THE ROOTS OF LEGUMES.

ure, and hence is better able to withstand drought. No small compensation for the trouble of green manuring consists in keeping the weeds down. A field of corn sowed with any crop during July is the best guarantee the farmer can have against weeds. A field not sown down will, as is too often the case, be covered with Roman wormwood, pigweed and other undesirable growths. The plowing in of green crops should be practised on all land subject to cultivation whenever there is a possibility of so doing. With corn, a crop of red clover, mustard or melilotus (sweet clover) can be sown after the last cultivation, and this can be cut and utilized for feeding and the roots plowed under just before

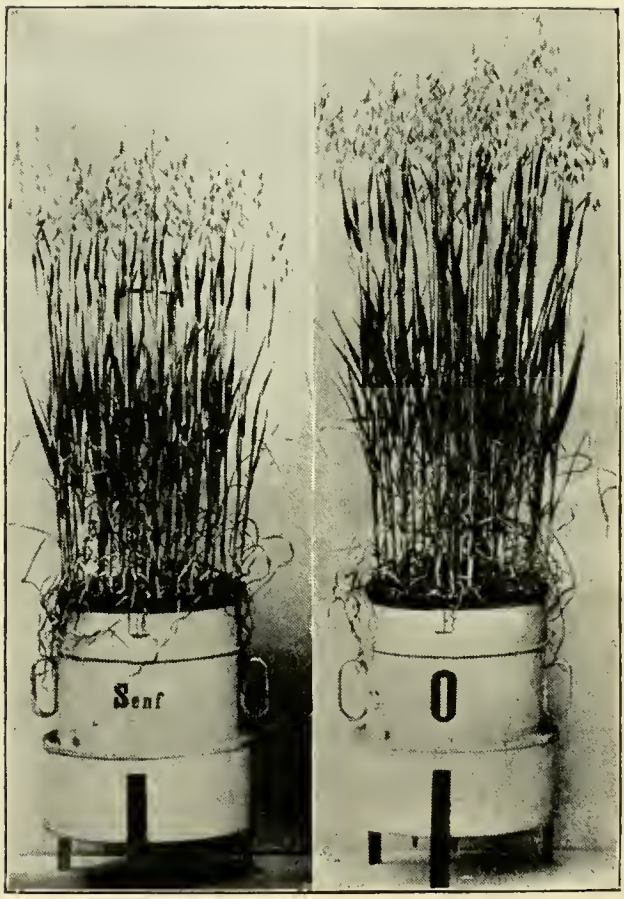


FIG. 2. Effects of Turning Under a Crop of Mustard (non-leguminous) upon the Growth of Oats.

Both pots were supplied with potash and phosphoric acid equally, but not with nitrogen. The pot marked "Senf" had mustard turned under; the other one had none. No immediate effect is shown on the growth of the oats by the previous crop of mustard.

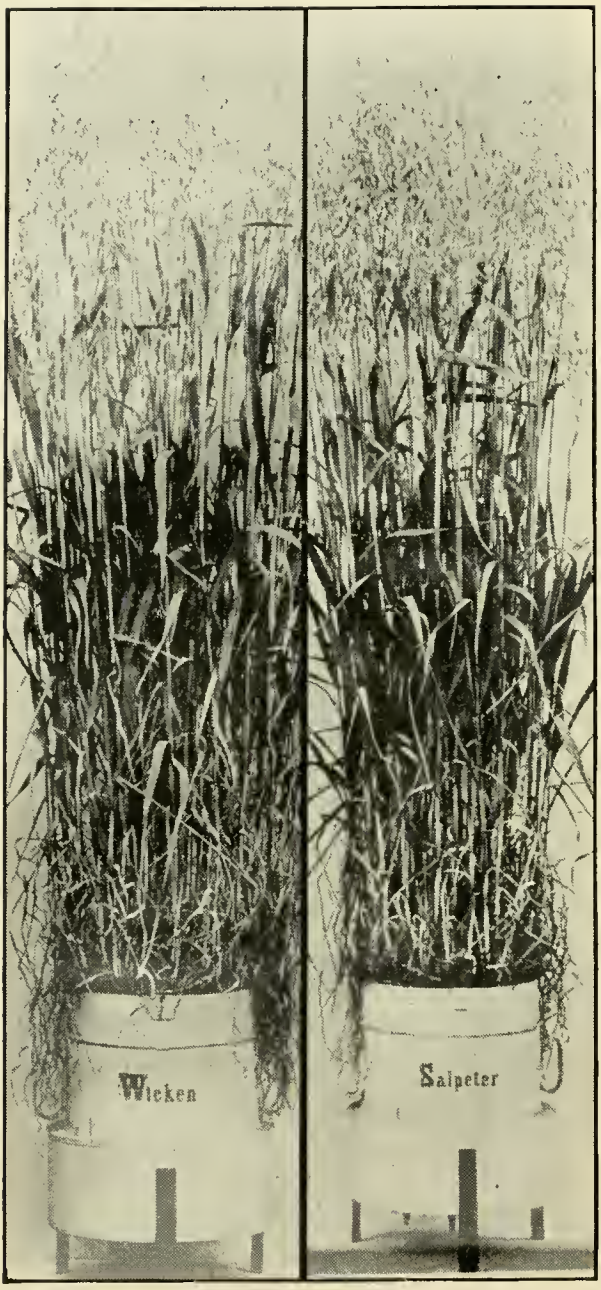
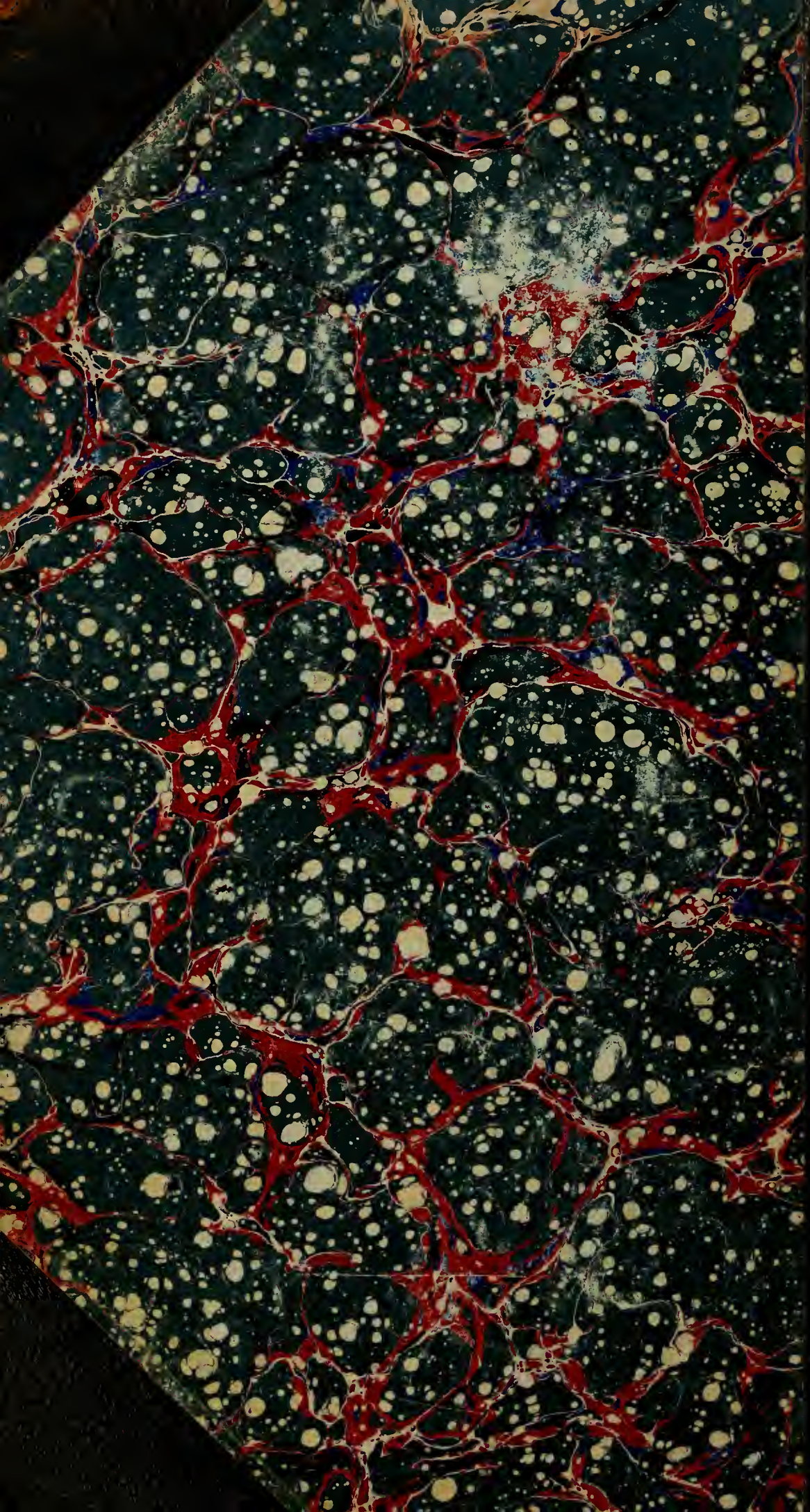


FIG. 3. Effects of Turning Under a Crop of Vetch (leguminous) upon the Growth of Oats.

Both pots were supplied with potash and phosphoric equally, as in fig. 2. The pot marked "Saltpeter" received its nitrogen in the form of saltpeter; the one marked "Wicken" had vetch turned under, showing that it was equal to saltpeter as a source of nitrogen.

the next year's planting. The common red clover and sweet clover possess an advantage over mustard, as their roots are provided with nitrogen-containing nodules, the product of bacterial activity (see Fig. 1.) In this case a certain amount of nitrogen is added to the soil, whereas with such crops as rye, mustard, buckwheat, etc., no such bacterial adaptation occurs and the soil nitrogen will not be increased from atmospheric sources. The leguminous plants constitute the best catch crops on account of the peculiar nutritive adaptation existing between the nodular bacteria and the atmospheric nitrogen. A crop of these plants can be sown and just before reaching maturity they can be cut, and, if necessary, fed to stock. The roots containing organic matter and a store of nitrogen can be plowed under. We have practised this system in our greenhouse to good advantage, a practice which, as far as we know, is not made use of in greenhouses to any extent. During the summer the greenhouse which is devoted to winter cucumbers and lettuce generally lies idle, and by sowing a crop of white lupine (which will develop in about six weeks under these conditions), or some other legume we succeed in adding to our soil a needed supply of organic matter and nitrogen. Experiments have shown that a crop of legumes plowed under is practically equal to a normal supply of nitrogen to the soil (see Fig. 2).

A certain stage of development in the crop is necessary in order to obtain the largest supply of nitrogen. This stage probably coincides in most cases with that when the seed are maturing. There have been a considerable number of leguminous plants grown for test purposes at the Hatch Experiment Station, in Amherst, during the past ten years or more, such as the white lupine, horse bean, serradella, alfalfa, soya beans, melilotus, Canadian pea, and the various clovers, etc. Unfortunately, however, the majority of these winter-kill in our climate, and only a few of them can be used for winter-soil covers. Among those best suited for our climate is the common red clover and the melilotus or sweet clover. The latter, when sown in July or at the time of the last cultivation of the soil, is capable of attaining a height of twelve to fifteen inches the following May, at which time the crop can be cut and utilized, and the nitrogen-containing roots can be plowed in. The red clover is also useful as a soil cover but does not always make sufficient growth in time for spring planting, it being considered by some to be less desirable on this account than the melilotus or sweet clover. The crimson clover is used as a soil cover and for green manuring extensively in the south, where it is hardy, but repeated trials have shown that it cannot be depended upon in Massachusetts, although it is not improbable that it might winter on some

of our sea-coast lands. There are some twenty eight species of wild herbaceous leguminous plants common to Massachusetts which, so far as they have been examined by us, produce nodules upon their roots, and much like those named above are capable of utilizing the free nitrogen of the air and adding it to the soil. None of these species, so far as I am aware, have received any attention as to their possibilities of being utilized as nitrogen gatherers. Many of these species, such as the bush clover (*Lespedezas*), wild lupine (*Lupinus perennis*), rattle-box (*Crotalaria sagittalis*) are peculiar to worn-out soil, and in all probability the rather sparing growth of these plants enables them to furnish some supply of nitrogen to these soils.

Owing to the increased use of commercial fertilizers of late years, and the limited application of barn-yard manure, our soils cannot be supplied with sufficient amounts of organic matter without recourse to green manuring. In early colonial times the farmers had access to leaf mould and vegetable decay, which were the accumulations of centuries, and the necessity for manures and commercial fertilizers was not so urgent. In order to bring our unremunerative soils back to a condition approaching that of colonial times, and to put them into a condition in which they will become remunerative and bear larger crops, we must follow the teachings of nature, which, as we interpret them, consists in supplying our depleted soils with more organic matter.